ALL-ROUND DX-ERS' COURSE

We have pleasure enclosing our All-Round DX-ers' course.

At the end of the Course, you'll find a series of questions relating to the subjects dealt with in the various lessons. The answers to these questions are listed on a separate sheet so that you will be able to check whether your answers were correct.

If you have any questions regarding the Course, or subjects mentioned therein, would you please write the(se) question(s) on a separate sheet of paper, which must also bear your name and full address.

You are advised to keep the text material on file as it will serve as a unique DX-ers' source of reference for later use.

The Course has been written by an international team of experts under the general editorship and co-authorship of Jim Vastenhoud, who has also written many of our other courses as well as some books on shortwave.

We hope that the present Course will be instrumental in helping you to discover the riches in both information and entertainment that lie hidden in shortwave radio.

Here's wishing you enjoyable hours of studying.

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Cette publication ne paraîtra en français
que l'année prochaine.

Eric Deschemin

12-05-88

ALL-ROUND DX-ERS' COURSE

Lesson 1 : What is DX-ing? By Arthur Cushen, Invercargill, New Zealand
A Brief Outline of the Hobby

The word DX stands for D (for distance) and X (for the unknown), and, a DX listener is one who explores the radio waves for distant stations. Forty-odd years ago, all stations were low power and all could be called DX stations. Today the listener has other problems : high power signals and low power DX signals with the modern conception of shortwave listening, jamming, propagation and many other facets of the hobby which have come to be recognised by the listener, things seldom known in the early days.

A DX listener must be prepared to give much time to the hobby in his initial days, be prepared to listen to known stations, learn the dial, concentrate on programmes in his mother tongue, so that he can sort out the frequency and get to know the position on the receiver dial, learn the special identification signals and station slogans to make identification possible, always remembering that DX signals are not reliable. If you hear a signal and feel you have sufficient details and have identified it, then you can send off a report. If you wait for a better signal tomorrow it may never be heard again.

The satisfaction of listening brings many rewards, a greater understanding of the world in which we live, contact with people in many countries, knowledge of geography and languages which cannot be gained in other ways, and keeping in touch with world events as they happen; radio can give you all of this. The DXer is also playing a part in world communications and study of reception and transmission problems. Without him the shortwave stations could only rely on their transmissions, and the value of them is unknown without the constant interest of the listener in acquainting the broadcaster of the condition of his signal at the receiving end.

Knowledge of languages, the realization that stations identify periodically, the study of propagation so that the area of the world to which you are listening can be determined, use of directional aerials, these are some ways in which rapid identification of signals is possible, and a good frequency log is also essential for reference purposes.

Local stations broadcasting without any directional aerial on low power, for an audience of listeners in the range of some hundreds of kilometres : this is the DX that some look for; and, it is the report from some 12000 miles away, which gives the station engineer the greatest joy, and you the DXer the greatest thrill when the verification is received.

The greater the distance and the lower the power, this is the way the DXer calculates the best catch. The band in which the transmission operates is also to be considered; lower frequency bands mean less time in which the band is open, shorter seasonal periods to listen, and a better all-round performance.

THE RECEPTION REPORT

After you have heard the signal, then it is time to start and log, write down the details which are carried by the station itself. The station has its log in which day-by-day items are entered by the announcer, so give details on musical numbers, announcements, commercial products if mentioned, and please, comment on programme content if you feel so inclined. Also, supply some details on your reception of the signal, details about your receiver and antenna mainly to let the station know whether you are an experienced listener with sophisticated gear, or using a household receiver. Give the time in UTC[0] or the station's local time (not your time), give the date in his day and write the date out in full, not in figures as this is not universal. In North America the month precedes the day when written in figures and could lead to the station refusing to verify, as they had checked the wrong day. Tell the station a little about yourself and if it is a small local station, send return postage, the larger international broadcasters do not require this. Write your report promptly after reception, do not put it away for a few days, current reception is what the station is interested in, not news which is past. [0] (Coordinated Universal Time)

The above information covers a shortwave report and on medium-wave there is little difference. These days there seems to be a concerted effort by many listeners to try and improve the quality and informative value of their reception reports to radio stations. To summarize, the report should be accurate and written in a courteous manner and it should provide programme information that applies to that station only. The listener should avoid using terms unfamiliar to the radio stations, and he should try and make every effort to include between 15 and 20 minutes of programme material. The reception report should give a good summary of signals, should if required include return postage and be sent to the station as quickly as possible. The listener should also have a comprehensive directory which lists all the world's radio stations. The World Radio and Television Handbook fills this need, as it is the only publication of its type giving detailed information on every station.

IN CONCLUSION

The first verification to be received forms the DXer's stimulus to the hobby. Then, because of his increasing interest, he may find that he hears his name called in a mailbag session from a station in another part of the world. The stimulus is there, he continues to search the bands for new stations, new countries to add to his total. Many DXers try to confirm radio stations in as many countries as possible thus adding quality to the DX hobby as well as quantity in the number of verifications. Soon the elusive stations are heard, stations which other DXers talk about, heard for the first time so easily, you wonder why you have not heard them previously. You find interest in a special band, erect a special aerial cut to this waveband and find signals are better, and you increase your log by several stations previously unheard on the band. You become conscious of signals in a noise that you cannot identify, and become aware of the signal-to-noise ratio of your receiver, and you then adapt the receiver to bring up the wanted signals and decrease the unwanted noise. You find that stations want you to collaborate with them by sending regular reception reports, a regular report is much more valuable to an international broadcaster than the occasional one, and you find that your radio is not just a means of hearing things outside your own country, it's your means of friendship with others, of knowledge and, best of all, you can tune the dial and be a world traveller right in your home, and find the fascination of foreign lands, to be as near as your own radio receiver.

Those who take you further in this course will, I know, elaborate more fully then I have done in various aspects of the hobby and also tell you about the possibilities which the numerous DX Clubs all over the world hold out in the way of club magazines, competitions, and looking after local DX interest. But this is sufficient to let you know what DXing is, what is in store for you in this fascinating hobby, and what rewards in fun, knowledge and friendship you will gain from it.

Lesson 2 : Your Playground - The Shortwave Range - by Jim Vastenhoud

If you look at the dial of a radio receiver, you will find a frequency, or wavelength indication there. Most receivers have several waveranges, and they can be selected by means of a knob commonly called a "waverange selector", offering you a choice between, say the medium wave (or Standard Broadcast) band, the shortwave range, or shortwave bands, and the FM-band. Any of these ranges on the receiver belong to one of the official frequency-band designations. The range between 3 and 30 kHz (kilohertz or kilocycles) is called the Very Low Frequency Band; 1 Hz (hertz) is 1 cycle per second, 1 kHz (Kilohertz) is 1000 c/s, 1 MHz (Megahertz) 1,000,000 c/s. The terms indicate a variable periodicity. The 30-300 kHz stretch is called the Low Frequency band, in which we find the long wave broadcasting stations; the 300-3000 kHz is the medium wave band; between 3000 and 30,000 kHz, that is between 3 and 30 MHz we find the high frequency range better known as the shortwave range, where the metre equivalents of the frequencies run between 100 and 10 metres. Above 30 MHz is the Very High Frequency (VHF) range, above 300 MHz we speak of the Ultra High Frequency (UHF) range, then comes the SHF (Super High Frequency) range, etc. This nomenclature was adopted at the Atlantic City Radio Conference, held in 1947.

Within these bands, frequencies are allocated to different kinds of services. As far as the shortwave range is concerned, the services are those which make use of the properties of this range to carry signals around the world.

Among its users are the "fixed" stations, handling traffic between fixed points on earth by means of directional aerials. They occupy about 48% of the shortwave spectrum. The so called "maritime mobile" bands occupy about 17½% of the total range; broadcasting stations take up less than 10% of the available range, which is about the same allocation as for the amateurs; aeronautical mobile bands cover about 8½% of the spectrum and the remainder is filled by land mobile stations and standard frequency stations. Most of these will be dealt with in later lessons.

In order to cope with the varying propagation conditions in different seasons, hours of the day, and sunspot variations, the allocations of these users are not restricted to one band, but are cut up in several small bands, usually around 250 kHz wide, distributed all over the shortwave range.

A closer look at even one small range of the spectrum will thus enable us to find most of the specified users. Between 20 and 22 MHz, e.g. we first have the standard frequency of 20,000 kHz, followed by a fixed services range between 20,010 and 21,000 kHz. The 21,000-21,450 range is an important amateur band, followed by the 13 metre shortwave broadcasting band occupying the range between 21,450 and 21,750 kHz. Fixed services fill the range up to 21,850 kHz, and fixed aeronautical mobile services can be found between 21,850 and 22,000 kHz.

The allocations just mentioned are on a world-wide basis. This is not the case for the frequency range up to say, 5.5 MHz, where regional allocations had already taken place before the importance of world-wide designation was recognized.

DXing is mainly concentrated in the shortwave broadcast band, and in the amateur bands, but interest in "medium-wave" DXing is increasing, while the Standard Frequency and Time Signal Stations have always been important to the serious DXer and the amateur.

The aeronautical bands hold only sporadic interest for the DXer, at least in the shortwave range. Other aeronautical bands, like the one found between 108 and 136 MHz, are getting regular attention in DX magazines.

Ships communications are usually of the so called "duplex" type, where ship and shore transmit at different frequencies so that monitoring with one receiver is an uninteresting business, and this is a possible explanation for the limited interest in the bands concerned.

Lesson 3 : The Shortwave Broadcast Bands - by Jim Vastenhoud

More than half of all DX activity is concentrated on less than 10% of the spectrum allocated to shortwave broadcasting. The international shortwave stations regard DXers as a reliable source of information on reception of their broadcasts, and give them every encouragement.

The shortwave broadcast bands are to be found between 3 and 30 MHz. The lowest band, running from 3.2 to 3.4 MHz is called the 90 metre band. This band is shared with others, namely fixed and mobile services (with the exception of the aeronautical mobile stations). The 90 metre band is only allocated to broadcasting in the so-called "tropical zone" of the world. A similar arrangement is the case for the 120 m tropical broadcast band, between 2300 and 2500 kHz. This zone stretches between 30° Northern Latitude and 35° Southern Latitude, but it is smaller in region 2, which encompasses the Americas, where it runs from 25°N to 25°S. The zones and regions are shown on the map (fig. 1).

The 60 metre band, which runs from 4750 kHz to 5600 kHz, has the same limitations; it can only be used by stations situated in the tropical zone. In between we find the 75 metre band, a very small frequency stretch ranging between 3950 and 4000 kHz. This band is not allocated on a world-wide basis. In region 2 mentioned earlier, this range is allocated to other services on a shared basis.

The tropical bands and the 75 metre band are designed for regional shortwave broadcastin International broadcasting takes place on higher frequencies, the lowest of which is the 6 MHz, or 49 metre shortwave band, situated between 5950 and 6200 kHz. This band is also the lowest shortwave range on many sets, and its value is best in regional broadcasting. Faraway coverage is limited, especially in the day time. At night, the 6 MHz band may propagate across many thousands of kilometres.

The next higher frequency range is 41 metres, to be found between 7100 and 7300 kHz. It is not allocated on a world-wide basis : in region 2 (the Americas) this band is designated for amateur use, while in some other countries (South Africa) only part of it is for the amateurs. The 41 metre band belongs to the same category as the 49 metres; mostly operated for limited international broadcasting, and only for long distance propagation when sunspot activity is low and in winter.

The 31 metre or 9 MHz band, is a real long distance shortwave range. It runs from 9500-9775 MHz, and it is a very popular range, also for near distance communication during daylight hours. Long distance broadcasting, however, is mostly experienced during the hours of darkness.

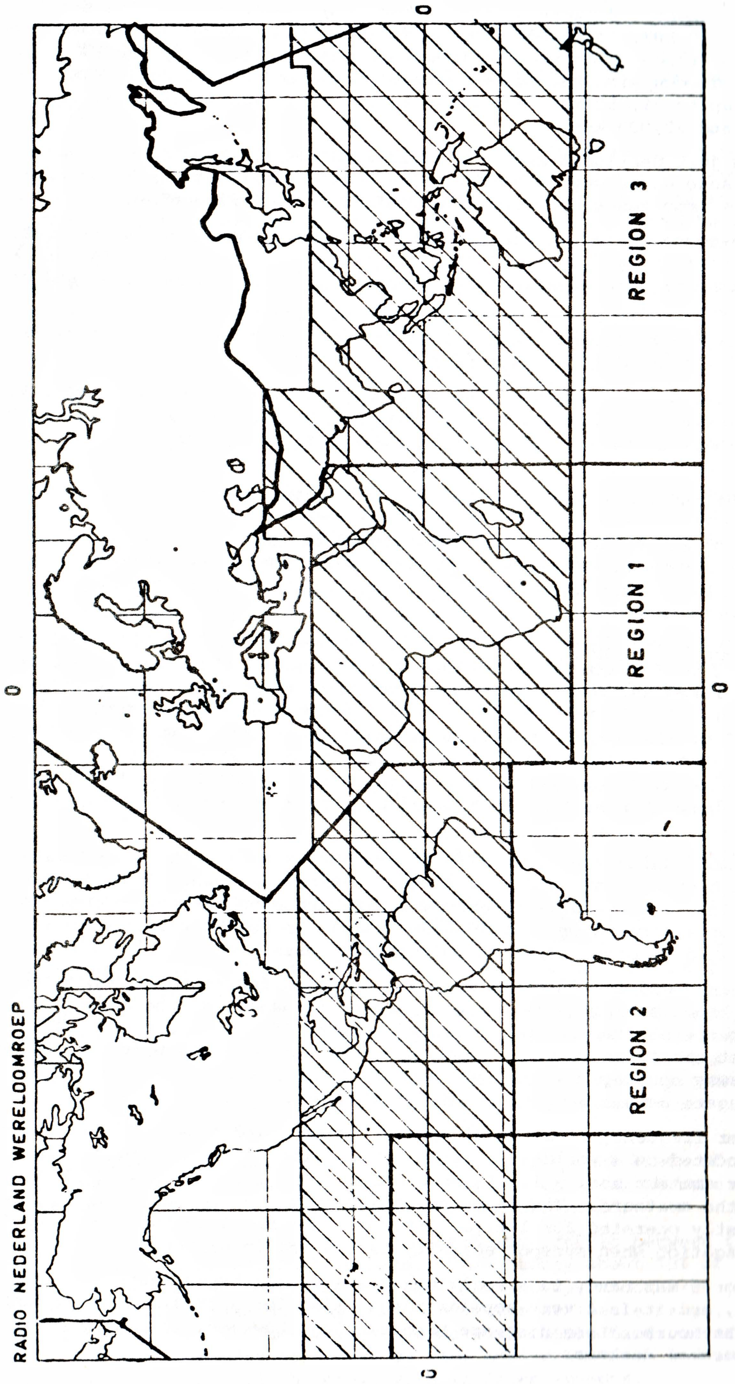


Figure 1

The 25 metre band is found between 11,700 and 11,975 kHz. It is mainly used for intermediate distances up to 5000 km in the daytime and early evening, and for long distances in the local evening and night hours.

The 19 metre band (15,100-15,450 kHz) has a width of 350 kHz and is the widest all-round shortwave broadcasting band in use. During the daytime, it starts coverage where the 31 metre band stops, usually at distances of over 1500 km from the transmitter. The 19 metre band is most important as a broadcasting band for the long distance, generally up to 15,000 km or so, from the transmitter. At further distances, absorption takes too much of a toll, leaving insufficient signal strength for reliable coverage. Generally, such a long range is only covered when the transmitting path is in darkness.

The 16 metre band (17,700-17,900 kHz) is a narrow one, and very heavily used for long-distance circuits during daylight hours and early evening in the reception area. As 17 MHz is the highest shortwave band on many receivers, too many shortwave broadcasters use it, thereby introducing a high amount of mutual interference.

The 13 metre band (21,450-21,750 kHz) is liked by shortwave broadcasters. It is less crowded than 17 MHz, and the frequencies used are propagated over very long distances, due to the limited effect of absorption. As long as sunspot conditions permit, the 21 MHz band also serves as an escape for the 17 MHz, although shortwave broadcasters realize that their audience at these high frequencies is restricted because only the higher priced receivers feature this band (which is really a great pity).

Although the 11 metre band (25,600-26,100 kHz) offers excellent daytime propagation under medium and high sunspot conditions (at least 5 years out of every 11), the number of receivers which sport this band is severely limited. That is the reason why it is not popular at all with the broadcasters. At the moment, about one third of the total frequency space assigned to shortwave broadcasting (800 kHz out of 2350 kHz) is situated above 20 MHz, and maybe about 10% of the listeners are able to listen to this part of the spectrum, because of receiver limitations.

In 1989, a number of shortwave broadcasting bands will widen up, as a result of the World Administrative Radio Conference 1979. Here are the new assignments for shortwave broadcasting, which include a new 22 metre band, running from 13,600-13,800 kHz.

5950- 6200 kHz and 7100-7300 kHz : Unchanged (7MHz not allocated in the Americas)
9500-9900 kHz : as of July 1st, 1994

11650-12050 kHz and 13600-13800 kHz and 15100-15600 kHz and 17550-17900 kHz and
21450-21850 kHz and 25670-26100 kHz : as of July 1st, 1989

How many stations can find a place within this frequency space? It is hard to say, but going by the knowledge that the spectrum allocation of a transmitter is 10 kHz, we might be led to believe that only 235 stations can be accommodated. However, this is untrue, because the stations are situated in different parts of the world and with a proper combination of frequency schedules and signal trajectories it must be possible to squeeze twice as many, or about 470 stations, interference-free into the spectrum. As the number of shortwave transmitters is estimated at between 1500 and 1800, it will be clear that the shortwave broadcasting bands are seriously overcrowded. It means that, in many cases, you will find a channel occupied by more than one station, with adjacent channels also taken by stations, all this resulting in a far from ideal listening situation.

Lesson 4 : Reporting - by Jim Vastenhoud

When a DXer listens to a station it may be because he is interested in the programme, but, more probably, because he is interested in the technical aspects of the "catch". In the latter case, he will report the results and expect to have his trouble rewarded by an official statement from the station concerned, verifying that he has indeed succeeded in receiving it. Such a "verification of reception" is commonly called a "QSL". This combination of three letters is one of the many which make up the so-called "Q-code", which is compiled following an agreement to shorten telegraphy traffic duration by using certain abbreviations for standard communications type of questions and answers. The combination QSL, which means either "Will you acknowledge receipt," or "I am acknowledging receipt!" is the acknowledgement the DXer can ask for when reporting to the station. In order to comply, the stations will want correct data regarding the reception. Supplying these data is called "reporting".

Now, what do we have to report to a station in order to obtain its QSL card? The answer is quite simple - "Those data which enable the station to check against its

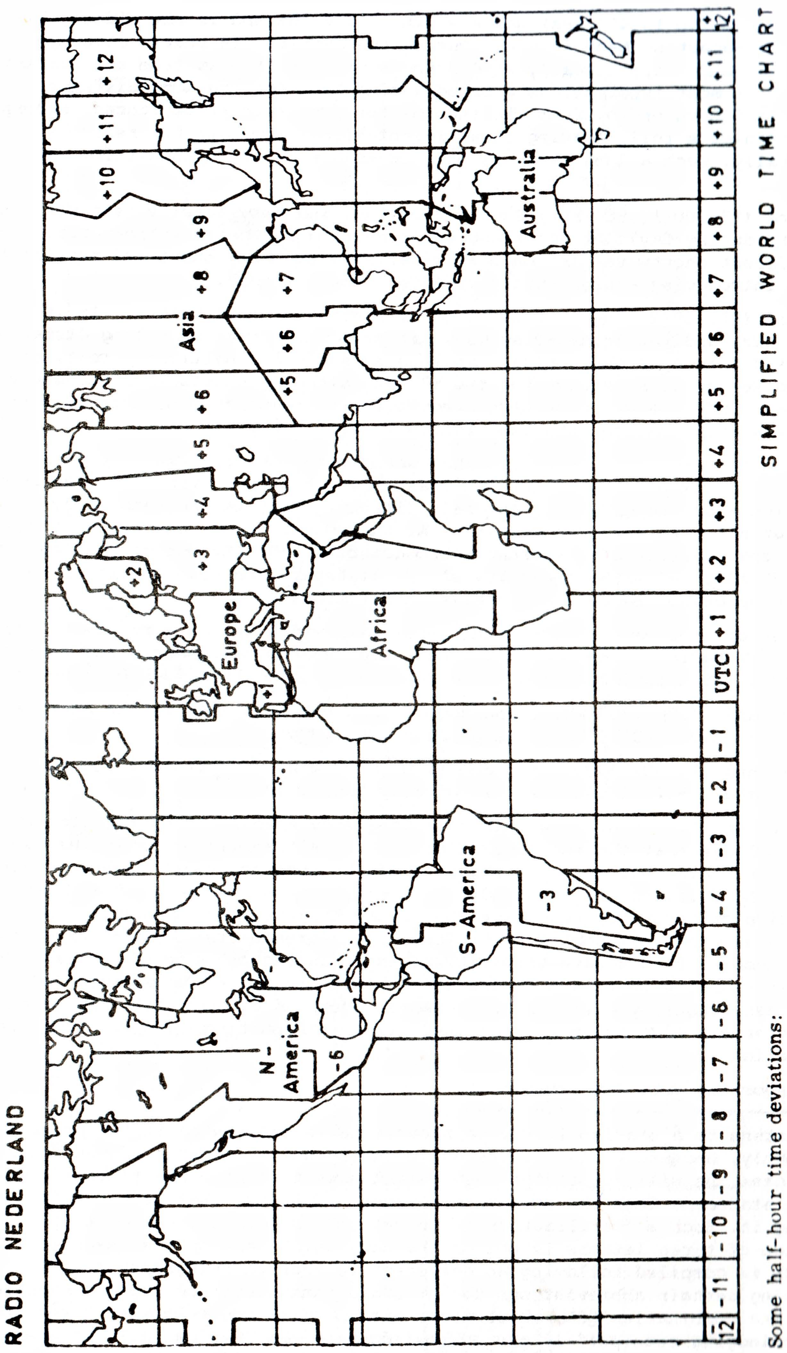

RADIO NEDERLAND
SIMPLIFIED WORLD TIME CHART
-12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 UTC +1 +2 +3 +4 +5 +6 +7 +8 +9 +10 +11 +12
N-America
-6
S-America
-3
Europe
Africa
Asia
Australia
+1
+2
+3
+4
+5
+6
+5
+6
+7
+8
+9
+10
+11
+12

Figure 2

Some half-hour time deviations:

Afghanistan	+4½	India	+5½
N + S Australia	+9½	Iran	+3½
Burma	+6½	New Foundland (Canada)	-3½
Ceylon	+5½	Malaysia	+7½

own log in order to verify that your report was correct".
Some stations verify without checking, but a verification card or letter sent on insufficient or incorrect data, is worthless. On the other hand, some stations do not verify at all. They may have too many frequencies in parallel, or several relay points carrying the same programme, or some other reason which makes verifying hard to cope with. However, these are isolated cases, so let us assume that in 9 out of 10 you will not be wasting your postage stamp.

In the first place, the station will need the FREQUENCY that you listened to, and here we touch upon an awkward detail as not everyone is able to read the exact frequency direct from his set's dial. The stations know this, and generally make frequency announcements in their programmes as often as time permits. The beginning and end of a broadcast give you the best chance of hearing a frequency announcement. If you fail to catch this information, it may not be possible for you to give the exact frequency, and some stations consider this as not meriting a QSL. We shall be coming back to this later in the Course.

What you can determine, however, is the frequency band in which the station operates, and approximately on what frequency it operates. Secondly, the station will want the TIME of the broadcast, for which we recommend using GMT (GREENWICH MEAN TIME), more properly defined nowadays as Coordinated Universal Time (UTC), or the local time of the station. This can be found by using the world time chart (see fig. 2).

A third particular in which the station is interested is the DATE of the broadcast, and, fourthly, PROGRAMME DETAILS. Lastly, one should include an indication of the reception quality, and for this purpose some cipher codes are available (see next lesson). PLEASE REMEMBER, A QSL MUST BE REQUESTED. If you don't ask for one, you will not usually receive it!

When it is a rare catch you have made, some additional data will be interesting for the station such as : details about your receiver, like the dial range in which the station was found; the class of receiver (simple, medium class, top class domestic, or communications type), and important data regarding your antenna. Furthermore, you can include your general impression of propagation conditions at the time of reception. This technical information should, however, be kept as brief as possible. Most letters will arrive at the desks of programme staff or secretaries, which have only limited interest in technical details.

Some points on reporting still remain, and they become more pressing as your stock of QSLs grows and the choice of stations becomes more limited, and more select. We must ask ourselves - "in what language shall we address the station" and - notably if it is a small station - "are we expected to cover some of their expense by enclosing an IRC (International Reply Coupon) with our report?" An IRC is a welcome help in coaxing smaller stations to reward your report with a QSL, but the bigger stations will QSL without. Please note that IRC's are accepted in most countries, but not in all countries of the world. As far as the language is concerned, it is always useful to report in the language the station was using while you listened. Our English-Spanish vocabulary, available on request, will help you when reporting to Spanish speaking stations.

Lesson 5 : DX Codes - by Professor Richard E. Wood

The Q-Code The last lesson used the terms QSL and said that this was one of the many three letter combinations which make up the Q-code universally used in radio communications. When letter call-signs were assigned to all countries, no assignment was made of combinations beginning with the letter Q. Instead of identifying stations, the Q combinations were given various MEANINGS. They are standard abbreviations accepted in all countries. They rule out linguistic problems and are brief and clear. The DXer should be familiar with some of these. Here are the most important :

QSL : a written confirmation of reception or contact. It must be requested by the listener, at the end of his reception report. It is used by the broadcaster and ideally includes date, time and frequency; preferably it is signed or stamped by a station employee. For a two-way contact, QSLs may be issued by both stations.
QRM : INTERFERENCE from man-made sources, usually other stations.
QRN : NOISE from natural sources, including atmospherics and static.
QSB : FADING, a cyclic irregularity in signal strength.
QRK : READABILITY, overall rating of a station's reception.

QTH : LOCATION, the geographic location of a station.
QRA : ADDRESS, the precise address of a station.

There are many others, used especially by amateurs, and they may be found in amateur reference works. The above will also be understood by major international broadcasters and may be used in reports to them.

SINPO And now we move from a code dating from the earliest days of radio to a rather new one, the invention of a man still highly active in radio circles today. This is the SINPO-code, originated by Gustav George Thiele of Deutsche Welle, and which has been officially adopted by the Commission Consultative Internationale des Radio-Communications (CCIR), also by many international broadcasters, including Radio Nederland. They specifically request that reports be sent in SINPO-code. Every DXer must, therefore, learn and use the SINPO-code. He will be helping the stations and also helping himself, by sending useful reports and thus increasing his chances of receiving a QSL. The figure 5 is the key to the SINPO code. There are five variables, and each of these varies from one to five. Let us take them in order :

S= STRENGTH. This is signal strength, as you observe it.
I= INTERFERENCE; This covers man-made interference, QRM in the Q code.
N= NOISE. Natural noise, static, crashes produced by lightning; QRN in the Q code.
P= PROPAGATION DISTURBANCE. This includes fading, a cyclic fluctuation in the signal as well as flutter produced by passage through polar or equatorial regions, and other irregularities in propagation.
O= OVERALL RATING. This is the sum total, dependent on the other four.

From the five key letters we pass to the five key numbers. 5 is the maximum, and "five fives", that is SINPO 55555, would indicate local quality reception. The S and O columns, for signal strength and overall rating, show the five ratings equivalent to five verbal explanations :

The I, N and P columns go as follows :

5 excellent	5 nil
4 good	4 slight
3 fair	3 moderate
2 poor	2 severe
1 barely audible, an unacceptable signal.	1 extreme

S-Meter Indication Many communications receivers have strength meters, calibrated in "S" (strength) units. These go from S1 to S9 counting in decibels, S9+10 db., to S9+40 db. To convert these readings to the five ratings of the SINPO code's S column, we may calculate SINPO "S" 1 shows as S4 on the meter. "S" 2 is around S7 on the meter. For "S" 3, the meter indicates slightly over S9. "S" 4 in SINPO is S9. 20db., on your receiver's meter; and the optimum, "S" 5 shows there as just below S9+40 db. It is important that the meter be correctly adjusted. DXers without such a meter must simply judge "by ear" but they should set themselves some definite, consistent standard.

SINFO Some stations replace the "P" column by an "F", for fading, thus making the SINFO variant of the SINPO code. In this way, only actual fading is rated. This may be done by observing the needle of your S-meter, and, referring to the second hand of a watch, counting the number of fades which depress the needle in the course of one minute. No fades would give an F rating of 5, less than five fades per minute would rate F4, between 5 and 10 rank as F3, 10 to 20 gives F2, and over 20 depressions of the needle give the lowest possible rating of F1.

The "O" figure is the average or sum total of the other four figures, and a 5 in the O position is generally only possible when all four preceding variables have also been 5. "O" cannot usually be higher than the rating given to "I". Hence, SINPO 42434 is incorrect. 42432 would be more accurate rating. Finally, it should be noted that the SINPO code, while accepted and endorsed by the world's international broadcasters, and by those with trained technicians, should not be used when reporting to small, ill-equipped stations designed to serve the local audience only, e.g. in Latin America. A description in words, in non-technical terms and without using abbreviations or codes, is then preferable. Radio Nederland's English-Spanish DX Vocabulary can help you here - obtainable free of charge on request.

RST Finally, a code used by amateurs and by SWLs reporting to them. It is the RST code. First, R for readability. As in the SINPO, there are five possibilities, ranging from R1, unreadable to R5, a perfectly readable signal. This is equivalent to the "O" rating in SINPO; There are nine possibilities for the second variable, S(signal strength) S1 is for faint signals, barely perceptible, ranging from S5, for fairly good signals, to a maximum of S9, extremely strong signals.

The RST code was originally designed for reporting CW signals, that is, signals in Morse Code, and T, for tone, originally applied to the tone of the code note. Today, however, it is used for reporting telephony also. T1 indicates an extremely rough, hissing note, T2 to T4 are increasing degrees of musicality of an a.c. note. T5 represents a musically modulated note; T7 denotes a near d.c. note with a smooth ripple, T8 just a trace of ripple, and T9 is the ideal, purest d.c. note.

Lesson 6 : The Receiver in Dx-ing - Some Aspects - by Jim Vastenhoud

The choice of a receiver is of great importance to the hobby. A cheap receiver has some of the biggest disadvantages that there can be for DXing, namely, insufficient selectivity, bad sensitivity and bad stability. Selectivity is the ability of the set to single out a small portion of the frequency spectrum. Good selectivity will permit receiving stations without interference from their neighbours. This is one of the most important characteristics, as the number of shortwave stations in the bands is far greater than the number that can be accommodated so that interference (stations degrading their mutual services) can still be experienced.

RANGE The majority of shortwave receivers do not have a sufficient shortwave range. The shortwave broadcasting bands run from 120 to and including 11 metres, with corresponding frequencies of between 2.4 and 26.5 megahertz (MHz). Typical tropical bands are the 120, and 90 and the 60 metre bands (2.4, 3.2 and 5 MHz). Most shortwave receivers in the temperate zone of the world run from 49 to 16 metres (5.9-18 MHz), but many only cover 49-25 metres (12 MHz). These limitations in the coverage can severely hamper your free choice of stations to listen to. Natural conditions govern the frequency choice of the broadcasters and we must strongly advise you to select a receiver which has an upper frequency limit in the shortwave bands at 21.8 MHz (the upper limit of the 13 metre shortwave band). The lower limit depends on the local and regional situation in the shortwave bands. In many tropical regions, it may be 2.4 or 3 MHz, and in the temperate regions 5.9 MHz. In some parts of the world, the 75 m (4 MHz) broadcasting band is also in use. It is, however, a rather narrow band which limits its usage (few stations, regional use only) and, consequently, its popularity among listeners.

SELECTIVITY Is a matter of circuitry. Nowadays, practically all receivers are circuited according to the "superheterodyne" principle, by which selectivity is determined by the number and the characteristics of the set's "intermediate frequency" (IF) stages i.e. a number of circuits which are all tuned to the same, fixed frequency. The greater that number, the better the set's ability to separate stations. Best for DXing is a variable selectivity, where the passband can be varied in steps in order to separate one station from another. The sound quality is bound to suffer if the passband becomes narrow, because we also cut off the higher audio frequencies of the signal.

SENSITIVITY Is a matter of circuitry, too, but in a middle class receiver of today, it is no longer a problem. Sensitivity is the rate of amplification that a set can cope with before it is merely boosting its own noise, and this depends to a large extent on the quality of the stage following the antenna circuit. In former days, an RF (Radio Frequency) pre-amplifier was a great advantage for the sensitivity of a set, but that doesn't hold true any more. The quality of the early stages (either tube or transistor operated) is now so good that they create very little noise of their own, so that sensitivity is sufficient in most cases. An RF-pre-amplifier, however, has some worthwhile advantages, which we will discuss later.

STABILITY The third "S" in the row, is not a property which many receivers can boast of. By "stability" we mean the electrical stability of the circuits, so that you can tune accurately and easily. Instability of the receiver's circuits will be demonstrated by a tendency of the set to drift away from the frequency to which it is tuned. The importance of good electrical stability grows when you tune into higher frequencies, and it is paramount when you want to listen to stations using SSB (Single Side Band) techniques, such as amateurs.

BANDSPREAD Apart from these 3 features, the DXer's receiver must, of course, be suitable for shortwave reception. The more dial length is reserved for shortwave, the easier it will be to tune in the bands. A disadvantage of most domestic receivers is that the circuitry is designed for broadcast band (medium wave) tuning, and that the same tuning condenser also serves for shortwave tuning. In that case, a frequency range of about 3 times the lowest frequency in the band can be covered, and so the "standard" shortwave range of most receivers runs from 6 to 18 MHz (49 to 16 metres) neglecting the important broadcasting bands above the 18 MHz frequency. This range may be sufficient for ordinary work, but it will rob you of your best catches later on in the hobby! So spreading of the entire shortwave range over 2 or more bands, "bandspread" as it is called, is a third important thing to consider when choosing a receiver.

So far we have dealt with ordinary receivers only, either table or portable models, either tube operated or transistorized. The serious DXer will eventually want a better receiver, a type that offers him a fine bandspread, accurate tuning or direct frequency readout, variable selectivity, additional circuits for receiving other types of emission, a noise limiter, a possibility to switch off its Automatic Gain Control (AGC) circuit or to change the characteristics of this circuit, an antenna matching circuit, crystal calibration, and so on. These receivers are more costly; deviations from the mass produced article cost a lot of money because production cost is higher and only a small circle of buyers forms the market. These (expensive) "communications" receivers can be first rate, but one must separate the chaff from the wheat. So do seek reliable advice before deciding.

Lesson 7 : Receiver Controls

Every radio receiver is equipped with a number of knobs, push buttons or toggle switches, and sports a dial and may be even a signal strength indicator. Some of these controls are self-explanatory; the tuning knob assists you in scanning the bands in search for a station, the waverange switch enables you to select the waverange of your choice, the volume control enables you to set the loudness at the correct level (never too high for SW listening!), the treble control and the bass control serve to adapt the sound to your taste. However, other controls have indications which are not so easy and clear, and you may wonder what their purpose is, and whether or not you need them regularly. In this lesson, we like to deal with those controls which you may find on your receiver and which are indeed either useful or necessary to carry out the hobby.

1. Antenna trimmer   Some receivers offer the possibility to adapt the antenna input circuit of the receiver to a receiving antenna of random electrical property. The control is called "antenna trimmer" or "antenna tuner" and can either be executed as a small control at the front of the receiver or a screwdriver adjustment at the rear. Usually, the antenna trimmer is adjusted once only to the type of antenna which is connected to the receiver.

2. Bandwidth, bandwidth control   The bandwidth of a receiver (it has nothing to do with bandspread) is the band of frequencies which, after selection by the tuning control, is amplified by the intermediate frequency stages of the receiver; all other frequencies are rejected and cannot pass these amplifier stages. Consequently, they do not reach the loudspeaker. Receivers of considerable age can have a bandwidth of 16 kHz, more recent types have 9 kHz bandwidth, and modern receivers restrict their bandwidth to 6 or even 4 kHz. Since the bandwidth is equal to twice the audio range, one can say that a receiver with 16 kHz bandwidth passes all audio frequencies up to 8 kHz, which produces an excellent sound quality. More restricted bandwidths lead to less sound fidelity, but have a better selectivity.

Older receiver types are sometimes equipped with a crystal filter (X-tal filter). This is a sharp filter which is, in fact, only useful for telegraphy operation, where a very narrow bandwidth can be required to separate stations. Receivers are equipped with a variable bandwidth. You can then adapt the selectivity to give you the best performance of the set : either sharp selectivity to cut off other stations, or good sound fidelity if there is no interference from adjacent channels. The bandwidth selector has at least two positions. Another useful feature is the so-called notch filter. This is a very narrow and sharp filter, which is usually tunable within the passband of the receiver, and is used to suppress heterodyne whistles, which occur when two transmitters operating on nearly the same carrier frequency, are received simultaneously.

3. Automatic gain control, RF-gain   Every radio receiver is equipped with a simple circuit called AGC, which stands for "automatic gain control". It serves to keep the audio level of the set approximately constant while tuning, although the incoming signals differ enormously in strength. Professional or semi-professional receivers, as well as sets used by radio amateurs, are often equipped with a switch to silence the AGC circuit. In such cases, the level of the incoming signal must be controlled by hand, by using the RF-gain control, which in fact regulates the amplification of the first stage, after the signal enters the set. Sometimes, the RF-gain is used in combination with a switched-on AGC, to deal with very strong signals, or with the reception of weak signals in the vicinity of strong signals in the band. The RF-gain is used to control or prevent "crossmodulation", where the strong unwanted signal is superimposed on the weak desired signal.

In some, more advanced receivers, the AGC (sometimes called AVC - automatic volume control) can be adapted to provide the best performance of the receiver under various fading conditions. The AGC selector can thus show the positions - fast-slow-off. Some receivers, fit for the reception of single sideband transmissions (e.g. by radio amateurs), have a special sideband AGC with a fast attack time and a slow release time, to cope with the special problem of gaining a DC control voltage out of a SSB signal.

4. Noise limiters   A so called noise limiter, sometimes indicated as ANL (automatic noise limiter) is generally a device which cuts off local interference spikes with a level exceeding that of the audio. In non-automatic noise limiters, the cutting level can be set by the control, and adjusted to your needs.

Sometimes, a receiver sports a noise blanker. This can be considered a glorified noise limiter. Here, the sound is cut off momentarily as soon as the interference spike from the local source (e.g. electric motors, passing vehicles) occurs. It makes tiny "holes" in your reception, which you will barely notice if they are of short duration.

Lesson 8 : The Antenna in Dx-ing - by Jim Vastenhoud

Without an aerial, shortwave DX is not feasible because of the character of shortwave propagation and the considerable weakening of the signal during its journey through space, and the relative inefficiency of a small telescopic antenna and a ferrite aerial at these frequencies. The most efficient shortwave antennas are those which make use of the electrical component of the radio wave to induce a tiny signal voltage in the wire, which is then guided with as little loss as possible, to the antenna terminal of the receiver.

The antenna is indeed very important,for what is the use of a good receiver if the aerial is not able to catch the shortwave signals, or antenna feedline attenuation (weakening of the signal while being transferred from the antenna to the set) is so heavy that only a small part of the available signal is transferred to the radio?

The general considerations in antenna construction are dealt with in Radio Nederland's antenna booklet, so that we will only touch upon them summarily. They are, good insulation for the high frequency signal, and that is different from normal insulation - as freestanding as possible, a length of preferably between 20 and 80 feet, and as far away from interference fields as possible. In most cases, the DXer will select the normal wire, or inverted "L" outdoor aerial; and this is a good choice, because the antenna type is allround and has little directional effect when it is kept between the lengths just mentioned.

Special types are available for those, who want to DX one band only. Types with a higher "gain" but a smaller bandwidth than a universal aerial like the type we just described. The "gain" or extra signal strength, can be obtained with the help of "tuned" antennas, which are designed for a certain limited range of frequencies; or, by giving the antenna directional sensitivity, i.e. preference for signals coming from one direction, or both (tune + directional).

Tuned antennas are usually a half wavelength long, and give optimum results in only one SW broadcasting band. Aperiodic long wire antennas are several wavelengths long and give a directional effect over more than one SW band. Tuned and directional antennas are usually called "beams" and consist of metal (wire) constructions of given dimensions, placed at specific distances with respect to each other.

A substantial gain in signal strength can be experienced if the antenna is properly "matched" to the input of the receiver. Proper matching can be obtained by a simple network of capacitors and coils which is usually called an impedance-matching circuit, a matching network or simply an "antenna filter". Many types of filters have been designed and worked out in practice. One of them, the so called pi-filter (π filter) gives proper matching when the impedance of the antenna is higher than the input impedance of the receiver. This is usually the case with an L-type antenna. The matching filter transfers the antenna energy to the receiver with the least possible loss and prevents attenuation by ensuring that all the available signal is indeed fed to the receiver and that nothing is reflected at its antenna input and sent back to the aerial. It is worked out in a description and a diagram in our antenna booklet, and is also available separately on request.

People who have enough space to erect an aerial are in a much more favourable position for Dxing than city dwellers who lack a garden or are surrounded by high structures which tend to reflect or weaken high frequency signals. However, the city dweller is more in need of a good aerial than the man in the country, because the electrical noise in urban areas is substantially greater than in rural districts. The only advantage of the man in the city is that he has sufficient chimneys to act as supports for his antenna, and this kind of support does not move in high winds so that the antenna wire cross-section can be chosen a little smaller, which could mean that it causes no visual disturbance to others. Due to the limited resolution power of the human eye, a number 28 wire (0.4mm) will not disturb your neighbour, but can serve as an excellent aerial for years, and enamelled copper wire is available in even smaller diameters. And, if outdoor antennas are not allowed, how about using a flagpole as a disguise? For city dwellers with some electronic experience, there is the possibility to erect a so-called "active antenna" (data sheet available on request), which is a small 2 ft rod plus a matched antenna amplifier at its feedpoint.

From what is said before, we must conclude that the antenna is vitally necessary for SW reception. So do everything possible to install the best one in your given circumstances, and do not hesitate to ask for our antenna booklet. For those with a particularly interest in antennas, we should mention that a SW Antenna Course is also available on request.

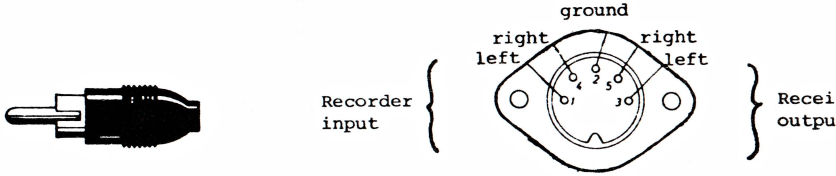
Lesson 9 : DX-ing With the Taperecorder - by Jim Vastenhoud

The number of DXer-tape-recorder owners is growing fast, and no wonder, for the recording machine is one of the handiest things available to the listener. With it he can record important announcements, language lessons, his kind of music, hot news items and, last but not least, he can use the recorder to help him when reporting, and in DX contests. The tape recorder gives its best service when reception is erratic and difficult to follow. Just record the lot, play it back a couple of times, and in the end you'll be able to make out the message.

Some radio stations are glad to receive taped reception reports. If you want to try your hand at tape reporting, keep in mind that your tapes must be listened to all through at the station, and that yours is not the only one they receive. This means that you must keep your information short and concise; record no longer than is necessary, and combine a number of reports gathered over a period of one or two weeks on one small 3 inch reel, or one cassette, which you send to the station by airmail, so as to be as up-to-date as possible. Use your microphone in between recordings to announce the frequency, date and time. Start the tape by introducing yourself and mentioning your address, so that the origin can be ascertained once the packing is off. Record the station by directly connecting the tape recorder output, or the extra speaker outlet of the receiver by means of a wire with the recorder-input. In this way a minimum of distortion will be introduced. Watch the indicator of the recorder closely to make sure the signal has the right level, and select the 3¾ inch per second speed (9½cm/sec) for reel-to-reel recorders, because it guarantees a reasonable frequency response and does not consume too much tape.

Keep in mind, however, that a taped report has several drawbacks for a busy station; it takes much more time to check than written reports; it has to be repacked and returned; it cannot be sent along the routine printed matter or letter channels, and it is subject to varying postage rates for different countries. On the other hand, its great advantage is that the engineers at the station are able to judge the reception quality for themselves, and to identify interfering stations. So you would be wise to contact a station before sending a taped report. Some stations, like Radio Nederland, have regular monitors posted around the globe, who send in taped reports on request. These stations will therefore ask you to stick to written reports, unless there is a sound reason for a taped report (personal question, peculiarity, interference by another station).

In some cases, a direct connection (via a shielded wire) between the receiver and the recorder results in a distorted recording, because the output level of the radio and the input level of the recorder do not match. If both units are of the same brand, there is usually no problem, but if European, Japanese and American makes are mixed, there could be trouble. In such a case, look at the plugs and sockets first. Usually, cinch connectors indicate that a higher signal voltage is used than (five pin) DIN connectors.



Cinch-plug

DIN-socket

Fig. 1

Some matching circuits are given below. They require a simple attenuation network to reduce the signal voltage to a level which can be accepted by every microphone input socket of a recorder. Since most receivers have either an extra loudspeaker output, or have easy access to the loudspeaker connection tags, the figure underneath shows how they can be matched. A screened lead is used, since the microphone input is sensitive to hum pickup. Also, this lead should be chosen not longer than 4 ft (1.2 metres). The attenuation network consists of two resistors (220 kilo-ohms and 220 ohms respectively) and one 0.5 microfarad capacitor to block any DC from reaching the recorder.

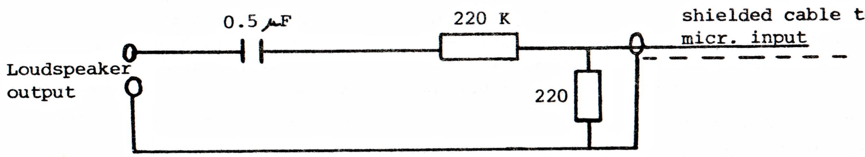


Fig. 2

It is also a common method to tap the upper and lower tags of the volume control. How this is done in a transistor radio, and which components are then used, is shown in figure 3.

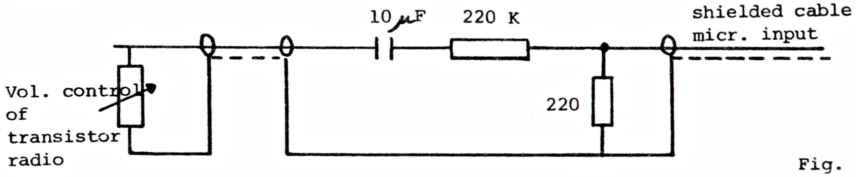

10 µF
220 K
shielded cable to micr. input
Vol. control of transistor radio
220

Fig. 3

If the radio and the recorder both have proper line-inputs, and are of different standards, the connecting cables look as follows :

1. Cinch output of receiver, DIN input of recorder

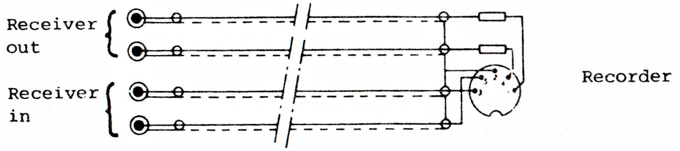


Fig. 4

2. DIN receiver output, cinch recorder input

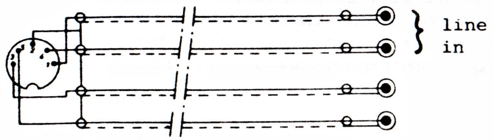


Fig. 5

N.B. The built-in resistors in fig.4 have a value between 50 k-ohm and 220 k-ohm (1/8 watt). In the case of fig. 5, the input level will be lower than normal but can usually be corrected by the recording level control.

Lesson 10 : Shortwave Propagation - by Jim Vastenhoud

Some people DX without the slightest knowledge of the limitations which nature imposes on shortwave propagation. The result is that they sometimes look for stations in the wrong bands, or write desperate letters of complaint after changes in the transmission schedules of shortwave stations, which are after all necessary now and then. This situation is an undesirable one,which can be eliminated with some basic knowledge about the behaviour of high frequency radiowaves on their way from the transmitter to the receiver.

Most people know that shortwave propagation is skywave propagation, meaning that the high frequency energy radiated by the transmitting aerial is bounced back by layers high in the sky, the most important of these being the so-called F2-layer. It is situated about 250 kilometres above the earth, and when a ray is radiated parallel to the earth's surface it will reach this layer at about 2000 km from the transmitter, hitting the ground after reflection at a distance of about 4000 km. The 4000 km is the longest reliable "hop"; shorter hops can be effected by using aerials with different radiation patterns, which radiate more or less upwards instead of parallel to the ground. Shortwave communications longer than 4000 km are possible by using the earth itself as a reflector, or, even better, by using the sea as a mirror.

Since the F2-layer is used to bounce the signals back to earth, its characteristics and effect, on incoming high frequency radio waves, require a closer look.

The reflective properties of this layer are due to ionization. The air density at this height is so small that solar radiation, and especially the ultraviolet rays of the sun, are able to ionize the air, setting off ions and freeing electrons. The concentration of electrons, or ionization gradient, determines the reflective properties of the layer; when this concentration is large, the layer will be able to bend even high frequencies (short wavelengths) back to earth; when it is low its reflective characteristics will be limited to the low frequency bands only.

What then are the factors which tend to increase the degree of ionization of the layer? Obviously, it has everything to do with the position of the sun, and with the amount of ultraviolet radiation by the sun. The position of the sun above a point where reflection of the incoming rays takes place, depends on 3 factors : the geographical location, the time of day or night, and the season. The amount of ultraviolet radiation by the sun, varies in an 11 year cycle, the so-called sunspot-cycle. Data regarding sunspot conditions are regularly published by solar observatories.

The condition of the reflective F2-layer (called F-layer at night, after the F1 and F2 layers have merged) determines the HIGHEST frequency that can still be reflected against the ionosphere. Its properties have been studied, and they continue to be studied by ionospheric sounding stations and satellites. The results of these studies are translated into computer prediction programmes, which are used by many international shortwave broadcasters.

The wave field emitted by the transmitting antenna suffers from considerable attenuation (weakening) on its way to the listener. The absorption of the path depends on the condition of ionospheric layers situated below the F2-layer, and the number of ground reflections which are necessary to reach the target area. The fact that there is a lower and an upper frequency limit for each trajectory for every point in time, means that the frequency usage of shortwave stations is susceptible to periodic changes.

Those interested in learning more about shortwave propagation, should enrol in our "Shortwave Propagation Course" or read books about the subject.

Lesson 11 : Latin American DX-ing - by Jan Tunér, Sweden

South America has, during recent years, increased in popularity among DX-ers, for obvious reasons. While other countries, including the Afro-Asian countries, centralize their broadcasting and increase power, South American radio remains more or less unchanged. Here we still have numerous low-powered radio stations to hunt for, and they all have a local flavour which gives the listener something more than standardized programming of the government stations. There are, of course, other areas with a similar multitude of local radio stations, such as North America, Australia and Spain, but these stations operate on medium wave and are much harder to get.

Before going into detail, let us see what we mean by Latin American DXing. You sometimes see other terms such as South and Central American DXing. These indicate the GEOGRAPHICAL area whilst Latin America indicates a CULTURAL area since Latin American states are those in which Spanish or Portuguese are spoken. Thus, countries, such as Haiti, Jamaica, Surinam and Belize are not Latin American. In the following, we shall deal with Latin American stations, since there are certain differences in the broadcasting pattern between LA stations and other South American stations. The latter are often more or less influenced by a former motherland with less stations, and with European management with a better knowledge of DXing.

Now let us see where we can find these interesting LA stations. They can be found in all shortwave bands from 120 to 16 metres, with the exception of the 41 metre band, which is not allocated for the American continent. You will find the majority of these stations in the tropical bands and in the 49 metre band. Furthermore, you should expect to find some of them way outside the broadcast bands. This goes for Bolivia and Ecuador, in particular. Government control over frequency use is not too great outside the major cities. And, to make it seem legal, these stations often announce their nominal frequency but in fact, utilize another.

The programmes of LA stations consist mainly of music, newscasts, advertisements and local announcements. A Swedish DXer who spent one year in Colombia, said, "Listening to the LA stations on a DX basis is exciting, but when you have to live with it, it's frustrating". There are of course exceptions: stations with a high programme standard. These are generally government-owned, or operated by nonprofit organizations such as churches. However, on average the programme quality is much lower than that of most European stations. The reason is simple, radio in these areas is not as serious a thing as it is in Europe. Almost anybody with the necessary capital can buy a transmitter and a licence in order to increase his capital. There is no income from licences, only from advertisements. Therefore, the expenses are kept at a minimum. The disc jockey is also the technician, the director is the secretary and producer. And, above all, postage for answering foreign listeners' letters, is considered a non-promotional and therefore unnecessary detail.

The reporting of LA stations differs somewhat from the reporting of most other stations. Taking the above into account you will realize that the knowledge of the DX hobby, and of our codes and principles, is negligible. Furthermore English is a little-known-language, and in order to get real results, Spanish or Portuguese should be used. This is difficult, of course, but there are report forms which could be used in combination with a dictionary. The best results are achieved by means of an individual letter with a personal touch. The report should not be too technical and no codes should be used. Write "signal strength" instead of QSA and "interference" instead of QRM. When it comes to the request for verification, you must be quite clear. Don't just ask for a reply. It is quite likely that the station, knowing nothing about DXing, will just send you a letter of appreciation stating nothing about the correctness of your report. You can phrase your request like this : "If the programme details quoted above clearly indicate that I heard your station on the mentioned time and date, I should appreciate a verification of the fact that I received your station. Please state date, time and frequency and reply either by means of a letter or postcard". Do not ask for a verification of your letter, that is not fair play.

After the technical part of your letter, it would be nice to write something about yourself, your city or your country, perhaps also mention what you know about the city and country of the station. This is part of the letter which is often more appreciated than the report itself.

So far, nothing has been said about programme details, so let us deal with this important factor now. It is always essential to mention at least three correct details of the programme heard, such as musical selections, names of programmes, sponsors, DJs, etc. It should be kept in mind that LA stations seldom keep a record of what music they present (Mexican stations seem to be an exception). This is unfortunate depriving us of one of the best means of obtaining programme details. Instead of music, we can concentrate on names of programmes, sponsors and products in the commercials. Since the station is financed by advertisements we can expect it to keep a good record of the sponsors.

And so the report is compiled. Maybe you can enclose a small souvenir like a post-card in order to "persuade" the station. This is better than the IRC (International Reply Coupon) which is unknown in South America, at least in the provincial parts. Mint stamps from the country in question would be the best solution. However, always keep in mind that these stations do not ask for reception reports, thus having no obligation to QSL.

The addresses of the stations can be found in the World Radio TV Handbook. Otherwise only use the name of the station plus the city. However, if you know the Post Office Box Number, be sure to use it. The mail service in many parts of South America is far from reliable and if you don't know the P.O. Box Number, it could be a good idea to register the letter. The short distance from the local Post Office to the station is often the critical part of the letter's journey. An excellent source of information on South American places is the annual South American Handbook. It can be ordered through your local bookstore and costs about $4.

So that's it. Now you sit back and wait for a QSL well earned. But here comes the drawback with the whole LA-DX situation. There is indeed much to hunt for, but you won't get as many QSLs per station as in other countries. Getting 50% verified is a good achievement. But of course this very fact is a challenge too. And remember, there are no "dark" stations as many DXers say, but there are varying methods of obtaining the QSL. This is where personal experience and skill enters the picture. And that is why, in spite of constant frustrations, the number of Latin American enthusiasts keeps growing. Join in, it is fun.

Lesson 12 : DX-ing the Asian and Pacific Areas - by Arthur Cushen

The vastness of Asia geographically is also borne out in radio; the many languages, countries and stations in operation make this most complex area of the world for the DX listener difficult to understand, for both international, regional and local stations carry programmes on the shortwave bands.

Firstly, we should realise that many of the stations are operated by the government or an authority, and so the initial of the operating organisation helps to solve the location. RRI (Indonesia), NHK (Japan), KBS (South Korea), AIR (India), BCC (Taiwan), and many more. Further, that frequencies in the tropical and international bands are in use in the area.

Taking some specific countries, Indonesia has most of its radio services on shortwave, but some medium wave stations are now operating, so that local and regional stations are to be found in the 120, 90 and 60 metre bands, and the regional and international stations in the higher frequency bands. The stations are linked frequently with Jakarta, and the familiar RRI slogan precedes the studio location.

The time zones in Indonesia have been standardized and they are now in hourly zones from 7 hours ahead of GMT for the Western area, to 9 hours ahead of GMT for West Irian.

The same type of transmissions operate in India, except that medium wave is also extensively used, but these programmes are also carried on shortwave in the 90, 75 and 60 metre bands, and then from the Delhi station for international services on higher frequencies. Japan is similar, NHK stations on medium wave are relayed on shortwave by low powered signals, but the international service is from Radio Japan. China has similar arrangements with medium and shortwave relays of the common local services, but in this case, they are notorious for operations outside the recognised shortwave bands. The Soviet Union also uses medium and shortwave for its services to the Pacific and Far East areas, and these are relayed through stations in Siberia. The race for higher powered transmitters has recently spread to Asia and Saudi Arabia, South Yemen, Bangladesh, as well as several of the United Arab Emirates. They have installed high powered transmitters both on medium and on shortwave and several of them have commenced an international service. These new transmitters range in power from 100 KW to 1000 KW and they provide strong signals in Europe and the Far East. In the main the programmes are in Arabic and a relay of the home service. Kuwait has an extensive schedule in English.

LANGUAGES Languages present the major difficulties in identifying signals from Asia. Korean Japanese, Chinese seem difficult to tell apart, but by listening to Radio Japan, KBS or Peking, one soon learns to distinguish between them. Many of the areas will be heard with transmissions which one may find difficult to identify. Remember that French is common as a secondary language in Laos, Cambodia, Vietnam, New Caledonia, Tahiti, while Spanish is heard from the Philippines. In the South Pacific the Maori language of New Zealand is common for many stations in this area. In some areas a form of English with many words in local vernacular is heard and this is known as Pidgin English. It is from the Solomons, and Papua New Guinea areas in partificular, while in Fiji, Hindi is used.

PACIFIC In the local services of many stations a broken schedule is in operation, mainly split up into a morning, midday and evening transission. One should also remember that these stations do not operate for long hours and most close their transmissions at 10.30 pm, local time. As many of the South Pacific stations are run by a Government agency, return postage is necessary in the form of an IRC or a CRC for British Commonwealth listeners.

ASIA On the Asian mainland almost all the countries have an international service, and the only areas in which language difficulties are overcome is in the Near East and Asian areas in which Arabic is basically the language spoken. "Huna" is the important identification word, for following this is the country or city from which the broadcast originates.

PROGRAMMES Few commercial stations which carry advertising operate in the Asia area. Sri Lanka and India have commercial programmes, and some of the Pacific Island areas including the Philippines and Japan, have a commercial shortwave network in operation. Gospel programmes are broadcast from three stations in the Philippines : FEBC, SEARV and Radio Veritas, and from other smaller stations on Taiwan, and in South Korea. In many other areas of Asia, the local Government has stations operated by Air Force, Army etc., and this is particularly so in Thailand, which has numerous stations of this type, and also some with commercial programming.

International broadcasters have a few relay bases in Asia and the Pacific. The BBC has its relay base in Singapore, the Voice of America is at Colombo and the Philippines, while Moscow has powerful relay stations in Siberia which carry programmes to the Asian and Pacific audience on both medium and shortwave. China also utilises these bands from relay stations to provide stronger reception in the target areas. The transistor boom has been keeping pace with the population explosion in Asia and radio sets and stations in the area are ever increasing in power and number. Listening to Asia is difficult, the most difficult continent for the DX listeners to understand and identify, but these tips on tuning into this area should help further in the understanding of this vast area of the world.

Lesson 13 : DXing African Stations - by Alain Descrières, Paris

The newcomer to the world of DXing will soon reach the moment when he is no longer content to listen to the powerful relay stations erected in Africa by giants like VOA, BBC or ORTF. Then he will try to catch genuine voices and music from African stations. With the exception of North African countries, all African broadcasters use in the first place, the so called "tropical bands" (90 and 60 mb) which provide the best short range service in this part of the world. Nevertheless, long distance reception can be achieved, particularly during the hours of darkness and in winter. In summer and autumn, reception is often more difficult owing to a high static noise level (tropical storms, etc.). Reception in the northern hemisphere of stations in the southern hemisphere is often best when it is summer in the north and winter in the south, especially on the low frequencies, as the vital first half of the propagation path is propagating much better during that hemisphere's winter.

In the past years, an increased usage of the 49 and 31 metre bands (6 and 9 MHz) has materialized. This can be explained by the wish to be heard abroad without having to support a costly separate international service, and also by the fact that most domestic receivers, and especially the low priced transistor radios, seldom include the 120, 90 or 60 metre band in their wave range. The most "wealthy" organizations will use the tropical bands plus the 49 mb. for their home services and higher frequencies (often chosen in the 16 and 13 mb), for their overseas transmissions. This is the case, for instance, of Radio R.S.A., in Johannesburg, and the Ghana

Broadcasting Corporation in Accra. In general, two sets of frequencies are used according to the period of the day and the season, the lower frequencies being in use in the morning and evening and in winter.

Another characteristic of African stations is their operating schedule; while most European and Latin American home services are transmitted continuously from the early morning to midnight, African stations are usually on the air 3 times a day - in the morning (07.00 to 09.00), at noon and in the evening (from around 18.00 to 22.00 or 23.00). At the weekends, there are longer transmissions. Please note that all times mentioned are local times. It is therefore important to check local time on a world time chart before trying to tune into a particular country. Programmes consist mainly of news repeated in the different vernaculars of the country, educational features and language lessons (English or French for vernacular speaking listeners). Another popular item is the musical mailbag session or listeners' concert often scheduled at weekends; this can be useful to identify the station since names and addresses are announced on the air, provided of course, that you are an expert in geography!

There is also a type of programme which is frequently used in Africa - the transcription programme offered by foreign stations. This can be misleading when you try to identify the station you actually receive on your set, especially for listeners in Asia and the Pacific who usually receive European and African transmitters in the 49 mb. with comparable strengths.

Before you send your reception report, pay special attention to the following points : Write preferably in the official language of the country, i.e. English, French or Portuguese in most cases, and in addition to the SINPO or SINFO report, include a short appreciation on the quality of reception in plain language; this is because station officials may not always be familiar with the cipher code you use. Send your report by airmail, and do not forget to enclose one or two IRCs. And with this, we wish you a good DX-safari.

Lesson 14 : DXing Different Modulation Systems - by Jim Vastenhoud

Every DXer knows what a heterodyne is; an irritating tone emanating from the speaker of the receiver when two stations operate on nearly the same frequency, and both carriers are within the passband of the radio set. In that case, the frequency-difference between the carriers will be processed in the receiver and become audible as a constant whistle.

The process of receiving telegraphy stations operating CW (for "continuous wave") goes much along the same lines. A CW signal is not audible on an ordinary domestic radio, because the information is conveyed by bits of carrier (dots, dashes) from the transmitter. The carrier frequency is only transmitted when the operator presses his key, and a carrier all by itself is inaudible in our receiver. How then do we manage to make it audible? Simply by generating a heterodyne artificially in the receiver. The circuit used for this purpose is the BFO, or beat frequency oscillator. Another name for it is CIO for "carrier insertion oscillator". It operates in the vicinity of the intermediate frequency of the radio, the IF being the frequency to which all incoming signals are converted before detection (demodulation) takes place.

The BFO is switched on, and creates a carrier which is also inaudible in the speaker, because it is ONLY a carrier without intelligible information. When the incoming telegraphy (CW) signal, converted into the intermediate frequency is now allowed to beat against the BFO, a tone will result when the CW-carrier is present, and the set will be silent when the CW carrier is absent. The pitch of the beat note can be varied by varying the frequency of the BFO, or by varying the relative position of the CW signal with regard to the BFO frequency by means of the tuning knob. Fig 1 will further clarify the interconnection of circuits for CW-demodulation in the receiver.

From CW telegraphy reception to single sideband reception is only a step. Single sideband is used in commercial services and by amateurs, and has several advantages over the so-called double sideband (DSB) with carrier used in normal AM broadcasting. In SSB, the audio signal is mixed with the high frequency carrier (a process called modulation), after which the carrier plus one of the generated sidebands is suppressed. What remains is a high frequency modulated signal without a carrier, which can be received by any AM radio, but which cannot be demodulated (detected) because the carrier is needed in this process. If we want to make it audible, we have to reinsert the carrier artificially, at exactly the right position with regard to the incoming sideband signal, and with the right level. This is also performed by the BFO.

The SSB-signal is converted to an IF signal in the usual way, and then arrives at the detector stage. Here we must add the carrier, but as long as it isn't manoeuvered in the right position, the signal will remain distorted. We must also take care to find the right signal ratio between the sideband and the carrier; best results with an ordinary rectifier-type detector are obtained with the BFO is about 6 times as strong as the incoming signal. So, in fact, we need an adjustable RF (radio frequency) preamplifier or a manually controlled AGC. If your set doesn't have these circuits - and most of them don't - try by using a shorter aerial, a variable (375 pF) capacitor in the aerial lead, or some other means to reduce the strength of the incoming signal. As the bandwidth of an SSB-signal is less than half that of a normal double sideband AM signal, a variable bandwidth is recommended; a reduced bandwidth will give best results.

As you see, making SSB signals audible with an ordinary domestic radio is not an easy job, and even with a communications receiver it requires quite some experience. Here's how correct tuning is done :

1. Tune until the SSB signal is well within the passband of the receiver. Use an S-meter to find maximum needle deviation. If you do the job by ear, turn the RF-control down, and the AGC (automatic gain control) off.
2. Switch the BFO on and vary its frequency quite slowly in order to find the right position. Usually the signal will still sound garbled, high pitched. Try to find the right position, keeping in mind that the BFO to signal ratio is better than 6 to 1 for good results. If this cannot be reached, the signal will remain distorted due to overloading. (fig. 2 is used for illustration purposes).

In radio amateur communications, SSB signals will use the lower sideband on the frequencies up to and including 7 MHz, but the upper sideband is used on the 14, 21 and 28 MHz amateur bands. This is important because it determines the position of the BFO carrier with regard to the single sideband signal.

Radio Nederland is able to help you to receive CW and SSB signals by putting a descriptive leaflet and schematic of a so-called product detector at your disposal free on request. This unit contains a BFO and a demodulator which is being suited for SSB type signals than a normal AM detector. The leaflet is available free on request.

Lesson 15 : DXing Utility Stations - by Maarten van Delft

NOTE - by Radio Nederland

The subject of Untility DXing is a rather delicate one for a radio station to deal with, because some countries have very strict rules about it. However, we realize that if we are to justify the title of our series ALL ROUND DXERS'COURSE we cannot do otherwise than include a lesson on this specialised aspect of DXing. At the same time we do advise you to find out what the official attitude is in your country, and to observe whatever regulations apply. One of the hard and fast rules is that you do not pass on information heard to third parties, but nowadays most private information is scrambled, thus eliminating much of the objection.

DXing Utility Stations Many DXers find that after scanning the broadcasting bands for a number of years, it becomes very difficult to add more new countries to their totals. Apart from the fact that due to various reasons BC (broadcasting) reception will be impossible from certain countries for a longer or shorter period (we need only think of propagation), several radio countries will never be heard at all in certain parts of the world, because their broadcasting services are on medium wave or FM. If you haven't heard New Caledonia, Gambia, the Seychelles, Guam, Upper Volta or even Antarctica, utility DX will enable you to do so. You may look for utility stations everywhere outside the broadcasting bands. And we mean everywhere, for all other bands (except those used by radio amateurs) are assigned to utility stations.

An abundance of radio beacons used for navigational purposes by aircraft and ships, is to be found in the longwave band and you may even come across them at some spots in the medium wave band. These stations constantly transmit their 1 to 3 letter identification in CW (morse) and trying to identify them is known to be the best method of learning the Morse Code well.

However, the shortwave bands offer a much wider variety of utility stations. You will be able to hear radio facilities at airports in contact with planes or weather reports from coastal stations for the benefit of ships anywhere in the seven seas. You will soon find the particular bands which are allocated to these stations and you will note that some coastal stations use a recorded identification to facilitate the tuning and adjustment of the ships' receivers. In other bands you will hear similar recorded speech tests and then you're bound to have "hooked" a so-called point-to-point station. These stations which maintain radio telephone and telegraph circuits and run telex and facsimile services from one fixed point to another fixed point, form another interesting utility category.

Most of these stations have a recorded identification, often multi-lingual and sometimes a short musical item - characteristic for the country - is added. A few stations only have a few notes as standard test recording and you can only identify them by "hanging on" till they stop the tape and call their corresponding station. These recordings are generally in the SSB mode, but you shouldn't have any trouble receiving them at normal speech level with a BFO on your set. However, as soon as the exchange of traffic starts, the modulation is scrambled for the protection of privacy.

For reporting to utility stations you need some special hints as there are differences compared to BC-DX. First, and foremost, you must realize that these stations are not interested in reception reports, simply because they don't need them. They get information on the readability of their signals from their corresponding stations and from other official monitoring sources. So, if they verify your report (many do and some have even issued magnificent cards), it is merely out of courtesy.Now you will understanc that you should compile a first class report, as detailed as possible. To prove that you heard the station, you should copy the details of the weather reports you received, the flight information you intercepted, or the wording of the standard test recording transmitted either in morse or voice.

Make you reports as personal as possible - never use a report form - be friendly and always enclose an IRC. To increase your chance for a QSL, write your report in the language spoken in the country concerned, or any foreign language they are likely to understand best. Utility DX is a hobby for those who like pioneering; you have to experiment a lot; there is only one book covering the subject - Utility DX Handbook, SPEEDX, P.O. Box 3, Elsinore, DA 92330, USA. This also applies to addresses of these stations, but your report will reach the right destination if you carefully note the station's name and location.

Finally, about the frequency where you heard the station. If you use an ordinary receiver, you will find it difficult to determine the exact channel on which you're listening. This problem can be overcome by buying a surplus frequency meter, an inexpensive crystal calibrator, or just indicating verified frequencies on your dial, thus making your own calibration. Frequency calibration may also be facilitated by comparing your frequency to that of a near standard frequency or time signal station. This special category of stations is a subject dealt with in another lesson in this course.

Lesson 16 : The Maritime Mobile Bands - by Jim Vastenhoud

The maritime mobile bands are the wave-ranges allocated for ship-to-shore, shore-to-ship and inter-ship communications. Let us first see what electronic equipment one may expect to find on board ships, and for that we shall have to split them into two groups. The coaster, ships of up to appox. 1600 tons, and the bigger seagoing vessels. Since coasters do not normally carry a radio officer, they have voice operated equipment operating in the 2 MHz range allocated for this purpose. In this band, the 2182 kHz frequency is the international distress and calling frequency. The ships are allowed to have other equipment as well e.g. equipment for working the shortwave maritime bands.

For ships of 1600 tons gross tonnage and above, telegraphy equipment etc., tuned to the 500 kHz distress frequency is a must. The band can be worked with both modulated carrier wave, and carrier wave. Practically all ships in this category also have possibilites for operating the shortwave maritime mobile bands, both keyed and voice, and they can be found operating in the ranges : 4.0 - 4.4; 6.2-6.5; 8.2-8.8; 12.3-13.2; 16.5-17.4; 22.0-22.7 MHz. These indications are rather rough, but enable you to locate the bands.

Although not compulsory, most vessels, even coasters, carry VHF equipment for communication with harbourmasters,pilots, etc. Direction-finder and radar are compulsory for ships of 1600 tons and above. An echo-sounder is a must for vessels of 500 tons and above, but other navigational systems like Decca, Loran, Consol and Omega are not. Facsimile receivers for the reception of weather charts are quite common on

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RADIO NEDERLAND'S
ALL-ROUND DXERS COURSE
Lesson 14
CW demodulation.

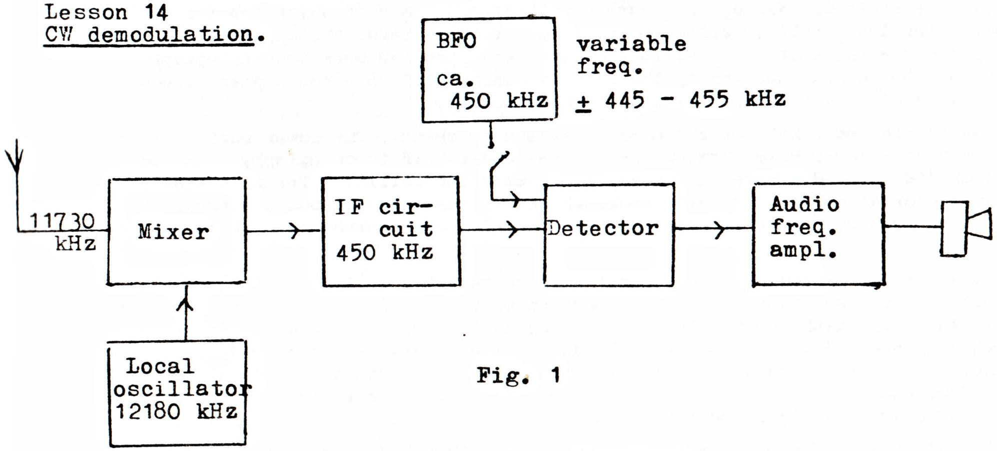
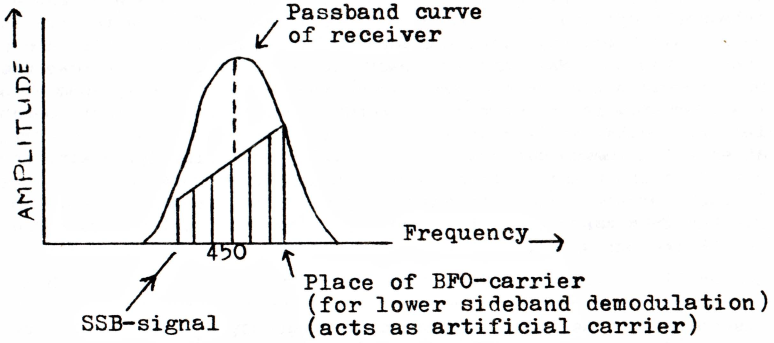


Fig. 1



Passband curve of receiver

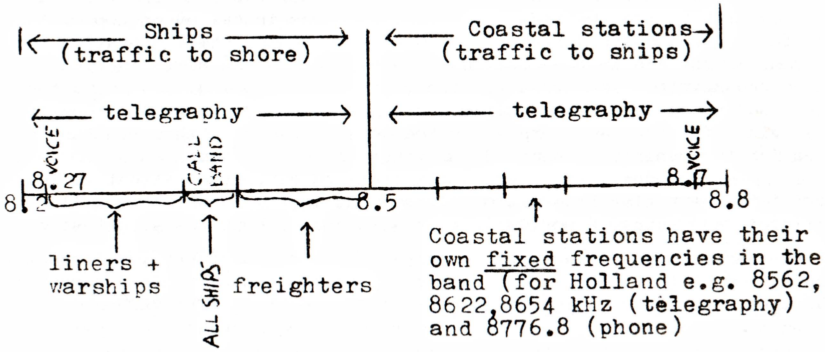
SSB-signal

Place of BFO-carrier (for lower sideband demodulation) (acts as artificial carrier)

Fig. 2

Lesson 16

Illustration of the 8 MHz Maritime Mobile Band (8.2 - 8.8 MHz)



Coastal stations have their own fixed frequencies in the band (for Holland e.g. 8562, 8622,8654 kHz (telegraphy) and 8776.8 (phone) passenger liners as well as cargo vessels. A small number of passenger liners, tankers and tugboats are equipped with TOR equipment (Telex Over Radio).

The most popular bands seem to be the 4,8,12 and 16 MHz ranges. As they have a characteristic subdivision per band, we will now focus our attention on one of them. Each band is again divided up in a number of channels, each of which has its own purpose. The lower half is allocated to ships' transmitters, the upper half being used by the coastal stations. As most coastal stations can work both telegraphy and phone, the coastal section of the band is again split up - the highest frequencies being allocated to voice, the lower half to telegraphy.

Now down to the lower half of the band, assigned to ships. The lower part of this range is allocated to voice transmissions, the upper half to telegraphy. In the middle of the CW band, there is a small range used for calling. The ship starts calling a coastal station in this range, which all coastal stations monitor. Once the contact is made, the ship supplies the coastal station with its working frequency, and can begin.

After the opening procedure, the coastal station operates on its own frequency in the high part of the band, while the ship operates on its own frequency in the low part of the band. So, with one receiver, only, one half of the conversation is heard. The transmitter on board is equipped with a number of crystals, which provide its accurate working frequency. Usually, liners and warships can be found in the telegraphy frequency range immediately under the callband, while freighters can be heard in the range immediately above the callband.

Usually, all traffic between ship and shore in the SHORTWAVE range starts with a telegraphy opening of the ship in the callband. The coastal station listens in, answers on its own frequency, gets the working frequency of the ship, and changes to it and traffic begins. When the ship wants to shift to phone, because one of the passengers or crew wants to make a phone call to the shore, the ship announces this and mentions the frequency in the part of the band on which it will start operating with voice, asking the coastal station on which frequency the return signals from the shore will be, after which communications can be established. Finally, a word about the powers of ships' transmitters. Output powers in the 500 kHz range vary between 100 and 1500 W. In the shortwave range, transmitter powers are usually the same as for the 500 kHz range. For the 2MHz range there is a restricted power output of 100 W DSB or 400 W PEP on SSB transmissions.

Lesson 17 : Time Signal and Standard Frequency Stations - by Maarten van Delft

Listening to Time Signal and Standard Frequency Stations is a special and interesting aspect of the DX-hobby. Those who don't realize the need of these stations, should try to imagine a world without a proper time standard. Besides, all sorts of every day difficulties that would occur, space programmes and other scientific research would be impossible. Apart from the fact that those services supply us DXers with a constant and accurate time, the standard frequency stations are of great help in determining given frequencies you may want while scanning the bands. In other words, you can calibrate your set and/or figure out its pointer deviation by tuning in to one of the well known standard frequency stations.

To many it is an unknown fact that these services have been run from the very early days of radio way back in the twenties. A transmitter was installed on top of the Eiffel Tower, in Paris, and the United States Navy (at present still operating such stations on Guam, Hawaii and in the Canal Zone as well as on the North American continent) also transmitted time signals, mainly for the purpose of adjusting the ships' navigational equipment. Many stations around the world are still transmitting time signal services for the same purpose in the coastal bands. Other stations offer their services for the benefit of numerous branches of science, such as seismology, meteorology, astronomy, geodesy, etc. Among the stations a constant effort is being made to co-ordinate their time internationally so that in the future they will all be able to maintain and supply a worldwide time standard without the slightest deviation.

An important frequency range for scientific research is the VLF (very low frequency) band which runs from 10 to 150 kHz. The intensive use of this band has a number of obvious advantages over the HF (high frequency) radio spectrum. The VLF-band guarantees continuous and reliable reception over very long distances all year round and this is a necessity for stability and extremely high precision, whereas the

HF-bands are affected all the time by various propagational phenomena. Unfortunately, very few DXers have this band on their receiver.

However, those of you who would like to have a go at these interesting stations, should try the standard frequencies in the HF range, viz. 2.5, 5, 10, 15, 20, 25 MHz. As most of the stations operating on these channels use atomic frequency control, you wouldn't wish for a better means to check your receiver's calibration. Caesium beam standards are used whilst only a few stations use a rubidium gas cell controlled standard which seems to be the last word in highly precise frequency standards. Some of these stations may easily be identified since they use voice announcements for their main checks. Among them are, BSF Taiwan, the two Italian stations IAM and IBF, JJY Japan, LOL Argentina, and WWV Fort Collins, Colorado USA and WWVH in Hawaii, both operated by the National Bureau of Standards. This institute is known to have the most advanced services and probably also the highest precision (people speak about deviations of a thousandth of a second). The time given over WWV and WWVH is in GMT (or UT2, as the world time standard of the Bureau International de l'Heure in Paris is scientifically known) every minute in voice. Musicians may even tune their instruments to tones given and also accurate and valuable propagation information is furnished in the transmissions. These tones may also be very useful to determine whether your crystals still have the exact value.

A number of stations work in the bands allocated for the use of stations operating fixed circuits and for a start you may try to log the only two of this category using voice announcement, i.e. VNG of the Australian Post Office, giving 1 minute identification 4 times an hour and CHU of the Dominion Observatory in Canada which has a time check in English and French, every minute. YVTO Venezuela uses 49 m BC band. All stations have second pulses which are a certain number of cycles (mostly 5) out of 200 Hertz. New minutes may be indicated by skipping a pulse or by prolonging one.

If you have trouble hearing a given station, it will help you to ask for the station's transmission schedule, because it may have changed or the station may have moved to another frequency as propagation conditions require. Having their detailed schedule at hand may also facilitate identification. Most stations will appreciate your letters but you should pay special attention to your report as it will generally reach scientists. Therefore, include as many details about your reception as possible; the way the new minutes are marked, whether modulated or unmodulated pulses are used, the exact wording of the announcements etc. You should also be aware of the fact that a report about one single reception is of little or no interest to the station; better make a comparative report featuring a longer period. You will be rewarded and enjoy this "beep-beep" DX.

The following stations all use voice identifications :

ATA	National Physical Laboratory, Hillside Road, New Delhi 110012, India. On 5000,10000 and 15000 kHz (all 8kW); weekdays 0330-1430, Sundays and holidays 0430-0830.
BPV	Zi-ka-wei Observatory, Shanghai, People's Rep. of China. On 5000 kHz 0800-1700, 10000 kHz 24 h and on 15000 kHz; 1700-0800.
BSF	Telecommunications Laboratories, Ministry of Communications, P.O.Box 71, Chung-Li, Taipei-320, Taiwan. On 5000 and 15000kHz (both 5kW) 0100-0900 between the minutes 00-05,10-15,20-25,30-35,40-45 and 50-55.
CHU	Radio Station CHU, National Research Council, Ottawa, Ont. KIA OR6. Canada. Continuously on 3330kHz (3kW), 7335kHz (10kW) and 14670kHz (3kW).
HD210A	Instituto Oceanográfico de la Armada, Casilla 5940, Guayaquil, Ecuador. On 3810 kHz and 7600 kHz (both 1 kW) at 000-1200 and 1300-2400 resp.
IBF	Instituto Elettrotecnico Nazionale, Corso Massimo d'Azeglio 42, 10125 Turin, Italy. On 5000 kHz (5kW) at 0645-0700 and for 15 min preceding the hours 09,10,11 etc., until 18 00. In summer, 1 hr earlier.
JJY	Radio Research Laboratories, 4-1-3 Midoricho, Koganei 184, Tokyo, Japan. On 2500, 5000,10000 and 15000 kHz (all 2 kW), continuous except for an interruption at 35-39 min past each hour.
LOL	Servicio de Hidrografía Naval, Observatorio Naval, Avenida España 2099, 1107 Buenos Aires, Argentina. On 5000,10000 and 15000 kHz (all 2kW), 1 hour transmissions beginning at 1100,1400,1700,2000 and 2300.
VNG	VNG Time and Frequency Standards Section, Telecom Australia Research Laboratories, Box 249, Clayton, Vic 3168, Australia. On 4500 kHz (10kW) 0945-2130, 7500 kHz (10 kW) 2245-2230, and on 12000kHz (10kW) 2145-0930.

WWV	Radio Station WWV, 2000 East Country Road., 58, Fort Collins, CO 80524, USA. Transmissions on 2500, 5000, 10000 and 15000 kHz (all powers 10kW, except for 2500 kHz which 2.5 kW). Continuous transmissions.
WWVH	Radio Station WWVH, Box 417, Kekaha, Kauai, Hawaii, 96752 USA. Continuous transmissions on 2500, 5000, 10000 and 15000 kHz (all powers 10kW except for 2500 kHz which is 5 kW).
YVTO	Observatorio Naval Cagigal, Apt. 6745, Marina 69-DHN, Caracas 103, Venezuela. Continuous on 6100 kHz (1kW).

Lesson 18 : DXing Television and FM - by Glen Hauser, Worldwide TV-FM DX Association

Yes, Television DX does occur. You may have noticed from time to time an improvement in picture quality of stations normally providing only a weak signal in your location. This is an example of "TROPOSPHERIC BENDING", "Tropo" for short, which under optimum conditions can bring in TV stations from up to 1000 kilometres away, or more. "Tropo" is caused by temperature inversions in the lower layers of the atmosphere. When hot air rises above a layer of cold air, the interface between the layers provides a path along which TV can propagate. This happens mainly in the summer and autumn, just after sunrise and around sunset, in the temperate zones, and along coastlines. It is much more effective on channels above 150 MHz, which excludes Band 1 in Europe and the so called "low" band in the Americas (channels 2 through 6).

But there's an even better mode of propagation for the lower TV channels. And that is SPORADIC E SKIP. Mainly during the summer months, but with a minor peak around the winter solstice, the E layer of the ionosphere, normally transparent to VHF signals, acquires sporadic, swiftly moving patches of ionization, which for a few minutes to a few hours will refract TV signals back to earth at distances of 800 to 2400 kilometres or even more if two or more patches happen to line up in a row. The lowest channels always open up first. Under very rare, extreme conditions, sporadic E (usually in Band 1) may extend up to the lower edge of Band III, or in the Americas, channel 7. The usual shortwave DXer thinks little about the various atmospheric layers involved in propagating the signals he hears. But on VHF and UHF, these differences are all-important and essential to recognize. A station received by one mode may be relatively commonplace, but by another quite rare. We've covered the two best-known propagations, but there are still several others. First, METEOR SCATTER peaks during the visual meteor showers, roughly at the same dates in successive years. This is the only mode of propagation that is really predictable. But you'll have to be on your toes and your receiver must be pretuned and quite stable; these ionized meteor trails, popularly known as "shooting stars" last only a few seconds, or just a split second. So the picture you see, bouncing off these trails, will be visible for only a very short time. The best time of day for "MS" DXing is around 6am, or whenever stations are running test patterns, which makes identification possible at a glance.

Then there's F-2 SKIP, which is basically just an extension upward in frequency of the usual long range shortwave propagation. This is possible only during peak sunspot years. 60MHz seems to be the upper limit of F-2; thus, only the lower channels in each transmission system are affected. Distances are usually over 3500 kilometres, so you may well have to equip your DX monitoring post for a variety of television transmission standards, if it isn't already. Worldwide TV DX is possible by F-2 skip.

If you live in Europe, you probably know that there are several different television systems, which are incompatible. Televiewers in the Americas and elsewhere normally deal with only one system, and do not need to equip for others except for rare F-2 long range reception. Some other TV DX propagations, the AURORA during prominent visual displays, may reflect highly distorted television signals, but clear FM signals. TROPOSPHERIC SCATTER over certain paths is highly reliable but requires advanced equipment. TRANSEQUATORIAL SCATTER has been known to propagate European signals in Southern Africa, and Saudi Arabia to Thailand.

ULTRA HIGH FREQUENCY channels (14-83) in the Americas; Bands IV and V in Europe; channels 33-62 in Japan have an inherently shorter ground wave range, but propagate well via tropo - better in fact than channels in the 174-220 MHz range, though inferior receiving equipment may obscure this fact. In North America, the UHF overland DX record is 1475 miles, Boston to Oklahoma City on channel 38.

A few techniques which may be of help in your TV DXing. Video carrier injection is achieved by tuning a nearby shortwave or FM receiver so that a harmonic of the oscillator frequency falls on the video carrier frequency of a DX channel. This will often allow the audio to become intelligible through "intercarrier" TV sets, when the DX video is quite weak. Certain countries, notably the US and Great Britain "offset" certain television stations by a few kHz, in order to reduce cochannel interference and allow slightly closer spacing of stations on the same channel. If you are receiving two or more stations simultaneously, one of which may be nearby, there will be an interference pattern between them, in the form of horizontal beat bars, "venetian blinds", or a fishbone pattern. The more bars, the farther apart the stations are in frequency. If you know the offset of one station, you can determine that of the other, and this may help to identify it.

What we've said about propagation of television DX also applies to FM DX, in so far as it applies to the more limited frequency range of FM, 87 to 108 MHz in most parts of the world. Because of the narrower bandwidth of FM signals, and the greater sensitivity of good receivers, compared to television, FM DX can often be successful when conditions are not strong enough for good TV DX.

Try taking photographs of the station's identification slides, this can make a very fine collection. You may need a close-up lens attachment, or portrait lens for your camera. Sensitive "fast" film is best, with a shutter speed of 1/25 to 1/30 of a second, recommended aperture settings depend on the amount of contrast and brightness in a particular picture. ("FAST" Film: 26 DIN = 100 ASA).

Whether you need a multi-standard TV set depends on your location and your TV DX objectives. But your receiver must be in good condition, and must produce a high-quality picture from local stations. Otherwise, you'll find it's just about useless for DXing. As for antennas, you will be able to get some of the stronger DX with just an internal V-dipole or "rabbit ears". But it's best to have powerful directional outdoor antennas, with facilities for rotating them to null out interference. You need not worry about polarization of TV signals, since DX propagation eliminates polarization characteristics.

There is absolutely nothing like television DXing. If you're thrilled at hearing remote radio stations, think how much greater the thrill when you not only hear but "see" a distant station!

Lesson 19 : TV DXing in Europe - by Jim Vastenhoud

In the previous lesson, Glenn Hauser informed you about the opportunities for DXing the VHF and UHF bands in the United States, and what he said goes also for many large countries where one television system is adopted. In Europe, however, a number of TV systems were adopted in the years when electronic equipment was a restricting factor in deciding the number of lines per frame, because the more lines, the greater the bandwidth of the video signal. At the moment, the French use for their VHF network 819 lines, and the rest of Europe uses 625 lines according to the CCIR (International Radio Consultative Committee) recommendations. Even in this 625 line/25 frames per second standard, differences occur. The adopted video bandwidth of the modulated TV signal is 5 MHz, with the sound carrier at 5.5 MHz above the video carrier, but in the OIRT (International Radio and Television Organization) countries behind the Iron Curtain 6 MHz was selected as the video bandwidth, with a video-to-sound carrier separation of 6.5 MHz. It simply means that if we can receive pictures from Eastern Europe, we cannot hear the sound, while if we tune in to the sound, the picture is either severely distorted or completely gone.

These factors are a limitation for Television DXers in this part of the world, because they would need a multi-standard receiver for a full coverage. Yet, this side of the hobby is actively carried out here, with regular catches in TV band I (40-80 MHz) in the late afternoon and early evening hours, particularly during spring and autumn, over distances of up to 1000 miles.

Hungary, Norway, Italy, Austria and Spain are seen on the screens in Holland and Belgium during sporadic E conditions, when their signals are reflected at a height of about 110 km above the earth.

UHF-DXing is a little more difficult, because it is less bound to certain times of day, but West Germany and Britain (625 CCIR-standard for their UHF channels) are monitored regularly by DXers over here. DXing the TV band III (175-230 MHz) is not so popular in this part of the world, due to the propagation characteristics valid for this range. It is above the maximum frequency for sporadic E-layer reflection which is about 100 MHz, but within the range where tropo occurs - although not as frequently as on higher frequencies.

For FM and television DXing, a good aerial system is indispensable. Due to the short wavelength, it is possible to erect a high-gain aerial without too much trouble. The higher the aerial is situated, and the higher the frequency (channel number), the more severe the signal losses in the cable running to the receiver, but compensation of these losses is achieved with the mastmounted antenna amplifier.

Still, it is a hard thing to select the right antenna, because the many different shapes and types are confusing. There are two main types : the wide band and the narrow band aerials. Wide band aerials are the log periodic and the bow tie types, while representatives of the narrow band type (with a high gain for but a few channels) are the Yagi and the Parabolic antennas. In both cases it is very important to properly direct the aerial to the station, and that is why the antenna rotator belongs to the standard outfit of a TV DXer.

The best way to get your catch verified is to convince the station you really received it. Therefore, a camera is needed. As the standard frame frequency in Europe is 25 Hz, the shutter speed must be at 1/25th. The best aperture is f5.6 with a sensitive film (21 DIN, 140 ASA). The best moments to shoot are either the test pattern, or the caption of a regular programme (newsreel).

This new extension of the old DX hobby is well worth trying, but it requires knowledge of TV standards and their geographical distribution, in order to determine what possibilities you have. After that, select the best antenna system that you can acquire, and get yourself a high quality receiver suitable for the TV system(s) desired. Finally, Radio Nederland offers a TV DX COURSE, free of charge, for people interested in this branch of the hobby.

Lesson 20 : Medium Wave (Broadcast Band) DXing - by Jim Vastenhoud

Rather than reminiscing about the causes of medium wave propagation in terms of reflective layers and their correlation with the position of the sun, we want to go into some practical data regarding the suitability and chances for medium wave signals to travel beyond their regional coverage area.

Medium wave broadcasting goes on in the standard broadcast band, a part of the medium frequency spectrum ranging from 525-1605 kHz (571-187 metres). In regions 2 and 3 - America and Australia - broadcasting between frequencies of 525 and 535 kHz is shared with other services. The medium wave band is clearly allotted for regional or even local coverage, as can be seen from the distribution of medium wave transmitters around the globe. The most reliable coverage is effected by the ground wave. As a rule of thumb, it can be said that, in the absence of interference and with a moderately strong transmitter, given in KILOMETRES, is equal to its wavelength in metres. From this it is clear that a transmitter operating on 500 metres (0.6 MHz) has a coverage range up to 500 kilometres from its transmitting antenna.

As said, this is a rule of thumb; high powered transmitters can range further, while propagation is also favourably influenced if part of the propagation path covers water. On the other hand, other transmitters working on the same, or approximately the same, frequency, tend to limit the range of a medium wave transmitter. Most transmitting antennas for medium wave are simple halfwavevertical masts, and the resulting coverage pattern is about circular if the terrain shows no irregularities. Ground wave coverage depends on the signal absorption by ground contact and is about stationary during day and night. From this point of view, the possibilities for DXing are limited.

During the daytime, medium wave propagation can be considered to be limited to ground wave propagation, as the skywave is absorbed by various low altitude (60-100 km) ionospheric layers. After sunset, these layers dissolve rather quickly, and absorption is rapidly reduced. Then, skywave propagation of signals in the medium wave broadcast band causes signals to propagate much further.

Engineering-wise, we can distinguish the following regular skywave coverage areas (again a reasonable transmitter power (100 kW or more) and an interference free channel) :

- for the SHORT medium wave (1200-1605 kHz) a night time coverage of about 1000 km.
- for the INTERMEDIATE medium wave (700-1200 kHz) a night time coverage of about 800 km.
- for the LONG medium wave (535-700 kHz) a rather unimportant skywave coverage. Also interaction between ground and skywaves tends to produce fading zones.

This division, which is a "smoothed" version of ideas existing at the 1975 Medium Wave Conference in Geneva, gives you an idea about regular skywave propagation characteristics

of medium wave transmitters. Medium Wave DX is, in the densily populated areas on earth, often a matter of patience and endurance; patience to wait for the right conditions to emerge, and endurance to sit up during the nights, waiting for transmitters in the region to close down in order to get a faraway station on the channel. Under these conditions, chances improve when there is a lot of watersurface on the path between transmitter and receiver.

To increase your chances, you need at least a sensitive receiver and an outdoor "L"-type or a loop aerial. Beware of signal losses between the antenna and the receiver, and also suppress as much as possible local interference from electric motors, vehicles or fluorescent lighting. Also, keep the volume of the set a little low to prevent the loudness of a strong station from masking the feeble presence of a far off or weak transmitter.

To conclude, we should like to draw your attention to short-duration possibilities for rare medium wave DX catches, during the light-to-dark and dark-to-light transition periods. Rapid changes in the lower ionospheric layers cause fading phenomena, which can cancel out a nearby station, thereby offering reception to another, faraway station on the same frequency.

Lesson 21 : Amateur Band Dxing - Jim Vastenhoud

Amateur band DXing, or "Ham band" Dxing as it is usually called, is a branch of the hobby that is widely practised. It is interesting to hear the chats of the hams when they use "phone" instead of CW, morse, telegraphy. The choice of using either of the two modulation systems lies with the hams themselves, as they can operate the key and will indeed use it when conditions make it necessary, for instance, when they want to make a long distance QSO (communication) or when they contact a ham who is heard to be working CW himself.

Where can we look for the amateurs, and what can we expect to find in the bands? First of all, here are the amateur bands :

160 m :	1715 -	2000 kHz	
80 m :	3500 -	3800 kHz	in regions 1 and 3
:	3500 -	4000 kHz	in region 2 (America)
40 m :	7000 -	7100 kHz	in regions 1 and 3
:	7000 -	7300 kHz	in region 2
20 m :	14000 -	14350 kHz	
15 m :	21000 -	21450 kHz	
10 m :	28000 -	29700 kHz	+ frequencies in the VHF and UHF spectrum

The 160 m band is reserved for amateurs with a special licence. It is, however, such a long wavelength that the limited output power of amateur transmitters makes DX hardly possible. The 80 metre band is mainly populated with hams with a lively technical interest. They use this band for regional chats, discussing their problems and are constantly out to improve their equipment. The same can probably be said of the hams who work 2 metres (144 MHz) and also the category who like to work 70 cm (435 MHz) although this is usually a younger group of enthusiasts. These people are not the real DXers among the amateurs, and therefore they use bands that do not lend themselves very well for this purpose.

Outside the Americas and Canada (region 2) the 40 metre band is only 100 kHz wide. The usefulness for amateurs in the Americas of the range 7100-7300 kHz which is shared with high powered stations in regions 1 and 3, is restricted due to interference from these stations, even though they are not allowed by ITU - International Telecommunications Union - agreement to operated TO THE AMERICAS in this range. This leaves us the 20,15 and 10 metre bands for real DXing, and here we can listen to faraway hams who span the globe with their limited output powers; the people who try to take advantage of favourable propagation conditions.

To get the most out of their rigs, they use systems with the highest possible efficiences, CW telegraphy or single side band phone. It is amazing to note the shift towards SSB which has taken place in the last ten years, especially in those countries where output powers are kept low by law.

SSB has the following advantage over normal AM signals :

1. no selective fading, because we need 2 sidebands for that.
2. the bandwidth of the signal is small (less than half that required by AM broadcasting stations).
3. SSB signals require no carrier. The full transmitter power can be put into the one sideband.

The bandwidth used for these SSB transmissions is 3 kHz, and for proper demodulation of these signals you will at least need a BFO, beat frequency oscillator, and an RF, radio frequency, gain control; or a manual gain control, plus sufficient selectivity and electrical ciruit stability on your receiver. Yet, it is well worthwhile to tune into the ham bands and to observe their way of working. Of course, you will also find normal double side band DSB modulated signals 6 kHz broad, so that an excursion into these bands will also always be worthwhile.

What nationalities you hear in the band depends upon the propagation conditions, and they in turn fluctuate with the time of day or night, with the season with solar activity, all of which are different for each position on earth. But, generally speaking, the highest bands are available during the daytime, while the lower frequencies prevail during the hours after midnight. Although amateurs and SWLs (Shortwave Listeners, the non-transmitting hams) can QSL via the QSL bureaus in the various countries, the DXer has to take a more direct way. He can look up the amateur's address in the Radio Amateur Call Book, and send in his report + an IRC. This will usually be rewarded by the desired QSL card. The Radio Amateur Call book has a US section available at about $12, and a Foreign Radio Amateur Call Book, for about $10.

The amateurs are organized in associations which usually bear a national character, and most of these organisations in turn are members of the IARU, the International Amateurs Radio Union, which has its seat at the ARRL headquarters in the USA, and acts as spokesman for the amateurs at international conferences where amateur band allocations are at stake. The amateurs also have a worldwide "intruder watch" - hams who listen in the bands to trace people who violate the regulations. They are then identified and the information is passed on to the ARRL, which then contacts the government of the intruding station. A fine body of people, these amateurs, who served communities many times during periods of stress and who made a big contribution to the knowledge we now have of SW propagation and associated phenomena.

PS - the output powers of amateur transmitter stations cannot be given, as they differ considerably for the various countries; many are limited to 150 watts, but some allow powers of up to 1 kW (ERP, effective radiated power) or to 1 kW PEP (peak envelope power). The ERP is the amount of energy actually radiated by the ANTENNA. The PEP is the TRANSMITTER power contained in the signal at the maximum peak amplitude.

Lesson 22 - RTTY DXing - by Jim Vastenhoud

Radio communications do not only involve the use of the human voice, but also of other signals that represent the vowels and consonants of the alphabet. A well known type is morse, where each letter is translated into a combination of dots and dashes, and then back into letters by the operator at the receiving end.

A quicker way of dealing with written messages is to make use of machines that generate a coded train of impulses, different for each letter of the alphabet, at the transmitting end, and a similar machine with reversed action at the other. This method, employing machines similar to typewriters, is called radio teletype; RTTY for short. It is among, other things, a branch of the amateur hobby (others are amateur TV, amateur facsimile) that is gaining in popularity lately. These "teletypewriters' are usually called "printers" or "teleprinters" and they are available in many countries at relatively low prices from such official bodies as telegraph and telephone companies, where they have been taken out of service because they had become too slow for modern operation. There are two types of printer, the tape printer and the page printer. The latter prints on a roll of paper about as wide as a business letterhead. The tape printer prints on paper tape which is usually gummed on the reverse side, so that it can be pasted on a sheet of paper in a series of lines. Attached to the teletypewriter is a pulse forming mechanism, which shapes the correct sequence of pulses once a key is depressed.

Sometimes, a so called PERFORATOR is also attached. It is a device that produces a PUNCHED tape which can be used either for repeating a message that has been broadcast, or for "recording" an incoming message for immediate retransmission. Playing back the perforated tape is done by running it through a special transmitting head, where it can be transmitted at a fixed maximum speed, usually about 60 words per minute.

In international traffic a limited number of codes is accepted; the one generally used in amateur radioteletype is the CCIT-2 5-unit code, where each letter is represented by a combination of pulses, the duration of which is standardized at

22 milliseconds. There are two possibilities, "no pulse" or "yes pulse" called "Space" and "Mark" respectively. The letter "A" for instance, is formed by 2 marks followed by 3 spaces. In front of each letter there is a space, and behind each letter there is a mark, so that a 7 unit code is formed consisting of a "space" start pulse, a combination of 5 spaces and marks, and a stop-pulse, which is always a mark. The duration of the stop-pulse is 31 milliseconds, so that it is considerably longer than an ordinary mark. It makes the total duration of each letter 6 x 22 milliseconds plus 1 x 31 milliseconds = 163 milliseconds.

The sequence of pulses is formed when the letter on the teletypewriter is pressed.

Although it is possible to transmit teletype signals by the "on-off" method used in CW(morse practice, it is generally preferable to use frequency shift keying (f.s.k) for this kind of work. It means that, when the marks are transmitted at the nominal transmitter frequency, the spaces are broadcast at a frequency which is about 850 Hz higher. This signal can be received by any good shortwave receiver, equipped with a BFO.

Usually, the receiver is adjusted for beat tones of 2125 Hz and 2975 Kz. These audio frequent tones are now fed to separate rectifiers to convert them into DC pulses, which may then be further amplified to the power level required to operate the printer. These operations are performed in the receiver converter, a piece of equipment situated between the receiver and the printer. It is the only extra piece you will need for RTTY DXing. A diagram of a receiving converter can be found in the Radio Amateur's Handbook.

Lesson 23 : DX Organizations - DX Clubs - by Jim Vastenhoud

If you have followed the past 22 lessons of our course, you must have learned a lot about DXing and its various branches and we hope it has helped to increase your interest in the hobby. This lesson and the next one, will deal with a very important aspect of DXing, namely, organized DXing.

Although the hobby is one that you can pursue on your own, it is considered of prime importance for a DXer to join one of the many DX clubs i.e. groups of people who stick together for the sake of their hobby, who help each other in solving problems which will undoubtedly arise and who discuss interesting matters or new developments related to the hobby. This inter-DX communication is highly desirable, especially for the beginner, while it stimulates the other members to further action, and opens up new fields. The DX Club has a binding function; it links people who read the same club paper and in it find a record of collective effort and competition: who has the highest score this month? Who was the recipient of the first new QSL from a station? Who collected the most QSL cards and who is heading the QSL review? Who has the best tip on reception improvement this month? In a good club paper we will find reports on the different fields of activity, reports from regional meetings of members, instructive articles, interesting stories about the hobby, and data regarding reception and verification.

There are a great many clubs scattered around the globe, almost all of them run by DXers in their spare time; "DXing is not yet infiltrated by commerce", and usually the club's fees are kept low so as to encourage young people to join. We strongly advise active but still lone DXers to apply for membership in one of the clubs. Finding them is no problem. Many of the established clubs are listed in the World Radio and Television Handbook. A more complete list can be obtained from the European DX Council, Great Britain. Of course, radio stations with a DX programme will give you a helping hand if your efforts do not lead to a satisfactory result.

One of the most sociable happenings in the DX club is the DX-pedition, in which the members of the club come together for a night or a weekend, rig their antennas, unpack their receivers, and start hunting for stations, discussing phenomena, exchanging experiences.

Radio Listeners' Clubs DXers are important to shortwave stations, mainly because they provide regular and accurate reports on the reception of their broadcasts. To stimulate the flow of reports, an increasing number of shortwave broadcasting stations have formed clubs of their own. These "Radio Listeners' Clubs" are not DX Clubs in the strict sense of the word, but it is interesting to know something about them. To become a member of a station's club, the listener usually has to send in a number of reception reports within a limited period. He is then admitted, and may receive from the station diaries, posters, and other small gifts after supplying further reception data required by the station. The listener can then call himself

MONITOR of the station and as such receives special attention. This is also a form of DXing, although it is more of an agreement between a SW station and its club member-listeners. Radio Clubs are not considered DX Clubs by the DX organizations, and some DX Clubs even resent them sometimes because of the professional organization and financial scope of broadcasters.

Amateur Clubs

Some people find it difficult to differentiate between DXers and the so-called Hams, or Amateurs. The latter are people who are licensed to operate a transmitter of a restricted output power. There are about half a million of them in the world, and they are organized in Amateur Clubs. By far the largest of these is the American Radio Relay League, ARRL for short, which publishes the Radio Amateurs' Handbook.

However, there is a category of people in this sector who do not actually transmit, but specialize in DXing the amateur bands. These people are not given the ham call letters, but a number instead. They are given the same verification facilites as the active hams, which in this well organized field is a great asset, for they can send their reception reports to the QSL offices of the Ham organizations, which then deal further with them.

These people sometimes call themselves "SWLs", the combination being the obvious first letters of the words "short wave listeners". The term, however, has a more general definition in the shortwave world, where everyone who is actually looking for a DX catch is a DXer, while someone who tunes in to a shortwave programme for reasons of entertainment, education or information is considered to be a SWL.

So much for the various kinds of organizations to which it is possible, and advantageous, to belong. In the next lesson we shall be taking a look at the larger organizations, or DX federations, which take care of the interests of the DXer or SWL on a national or international scale. This latter development forms the most recent step forward giving the DXer a "voice" in matters concerning at least some aspects of modern communication.

Lesson 24 : DX Federations - by Harry van Gelder

In the last lesson we discussed the various kinds of DX organizations which serve the interests of the individual DXer. This time the larger national and international organizations, or DX Federations, will come under review.

There is, behind every concentration of interests, the thought that "united we stand, divided we fall", and though one does not need to belong to a club, or a club to a federation, to continue to pursue the DX hobby, it is certainly true to say that the existing organizations have done a great deal to promote its popularity by making it much more interesting and worthwhile. Listener DXing started, of course, with the birth of the shortwave broadcast. In those days, 50 years ago or thereabouts, every shortwave listener could be called a DXer. Some of the DX clubs started around that time are still in existence. The Newark News Radio Club, NNRC, has passed its 50th year and is still going strong; the International Short Wave Club, ISWC, which conducts the 3 yearly International Popularity Poll, was set up, in the USA, in 1929. There are 3 major DX listener federations in existence, and we will now take a brief look at each one.

Riksförbundet DX Alliansen - Swedish DX Federation

Sweden was the first to branch out on a larger scale, and form co-ordinating bodies for the numerous DX clubs in that country. First, came DX Alliansen in 1956, which was set up to further the common interests of the clubs, and to help solve their problems. In 1958 Sveriges DX Förbund was founded mainly to publish a DX magazine, Eter-Aktuellt, and to supply various items to the DXers, DX-Köp. In 1969, these two organizations joined forces in Riksförbundet DX Alliansen, RDXA, thus forming a united national federation for the Swedish DXers and DX clubs. The RDXA of today has almost 6000 individual members and about 50 member clubs. Individual membership is only open to Swedish Dxers.

The RCXA is based on a number of working committees, among these being the information committee, the committee of studying activities, and the international committee. One of these committees deals with the publication of an, all Swedish, offset printed illustrated magazine called "Eter-Aktuellt" issued 10 times a year, which has a very wide circulation. The head office address is : Eter-Aktuellt, Box 3108, S-103, 62 Stockholm, Sweden. Subscription fees for DXers abroad can be obtained from this address. Every competent DXer can earn an RDXA badge, which is awarded for different

umbers (25,75,.. 200) of verified countries. A "DX button" is available for ll DXers. This button is blue with symbols of the hobby in yellow. A request or it and two IRCs are enough to get it. The RDXA also awards gold and silver plaques for outstanding services to the DX hobby. So far, 5 gold plaques have been awarded; the first in 1965 to Mr O Lund Johansen, the founder of the World Radio TV Handbook, the second in 1968 to Mr Edward Startz (Radio Nederland) on the occasion of the 40th anniversary of his "Happy Station", in 1973 to Harry van Gelder of Radio Nederland for many years of support to the hobby and especially the World DX Friendship Year 1973, and to Arne Skoog of Radio Sweden founder of DX Alliansen and editor of Sweden Calling DXers for more than 20 years, and one to Jim Vastenhoud a couple of years later.

One of the most important activities of the RDXA is the annual "DX Parliament". This is organized by one of the member clubs in the month of June. Besides the hundred or so delegates from the member clubs, the Parliament is also attended by representatives of shortwave stations, who answer questions concerning the broadcasting side of the hobby, and discuss and try to solve mutual problems. DXers from other countries are also welcome to attend the Parliament. Over the years the event has become more and more international.

The RDXA has its seat in the Swedish capital. The address is : Swedish DX Federation, Box 3108, S-103 62, Stockholm, Sweden. (Contributed by Owe Nordin, RDXA).

Association of North American Radio Clubs (ANARC)

Working to co-ordinate the various DX organizations on the North American continent, ANARC is the "United Nations for Clubs". Its members are the dozen or so main clubs. It describes itself as a "non profit organizational body, composed of appointed club representatives from most major shortwave, broadcast, ham, TV-FM and utility interested clubs".

Voting representation depends on the club membership strength, with a maximum of 3 representatives for any single club. Clubs with less than 50 members may become Associate Members and will receive the Newsletter but will not have voting rights. Specialized activities are carried out by a number of committees which include Public Relations, Awards, Frequency Recommendations, QSLs, BCB Reports, Manufacturers Liaison, DX Archives, Country List and Convention. Like DX Alliansen in Sweden, the ANARC Convention is held in a different city each year. A highlight of the annual meeting is the "Man of the Year" award. On the recommendation of the ANARC Awards Committee this distinction goes to the person rendering the most oustanding services to the DX hobby within the past year. Those honoured have included such well known persons as August Balbi and Arthur Cushen.

The ANARC Newsletter is sent to club representatives and committee heads. It gives details of major club and inter-club activities as well as ANARC matters. Individual subscriptions are available. The administrative address is : 409 Laconia Lane, Schaumburg, Ill 60193, USA.

The European DX Council, EDXC (P.O. Box 4, St. Ives, Huntingdon PE17 4FE, England)

The European DX Council was founded in Copenhagen in 1967. Its aims, according to the statutes are a. to promote co-operation between European DX Listeners and between European DX Organizations and b. to achieve common objectives in the field of DXing. c.To establish and remain in close contact with other DX organizations throughout the world. d. To improve contacts between DX listeners, radio stations and other organizations in the field of Radio and Telecommunications. The EDXC has published a whole range of brochures on various aspects of interest to the DXer. Among others information on propagation, band coverage, reporting, "radio countries" and so on. The Council co-ordinated the activities in the World DX Friendship Year 1973 in Europe, and through its annual meetings has contributed much to a better understanding among people from different countries.

Presently, the European DX organizations connected with EDXC, represent about 25,000 shortwave enthusiasts in the European countries. Apart from representation through the member/observer DX clubs in the Council every individual DXer is welcome to actively participate in all Council matters. The work of the EDXC is done by a Secretary General, who is elected each year, his secretariat, several working committees, the club representatives and individual DXers who subscribe to the monthly "EDXC Newsletter".

India

In India there has been a merger of 3 leading DX Clubs, i.e. Indian Association of DXers,

Radio DX Club of India and Hyderabad DX Club. The new organization is called Indian DX Club International.
The address is : 26/1B Northern Avenue, Calcutta 700 030, India.

It was jointly agreed at a Winter DX Conference in Madras, November 1974, that there was an urgent need for setting up an All Indian DX Federation. Pending this the merger was agreed upon to serve e.a. as a link between the Indian DX Movement and the similar DX Movements abroad.

Lesson 25 : The Co-ordinating Bodies in International Telecommunications -
by Harry van Gelder

The two previous lessons in our All Round DXers' Course were devoted to the various organizations which look after the interests of the individual DXer, and to the larger national and international organizations, or DX Federations, which serve the interests of the clubs. In this concluding lesson, we want to complete the picture by acquainting you with the organisations set up to act as, among their other functions, regulating and co-ordinating bodies to promote international co-operation between the radio and television stations. More particularly will the work of the INTERNATIONAL TELECOMMUNICATION UNION, ITU, be of interest to the shortwave listener.

The other important bodies are the EUROPEAN BROADCASTING UNION, EBU, the INTERNATIONAL RADIO & TELEVISION ORGANIZATION, OIRT, the UNION OF NATIONAL RADIO & TELEVISION ORGANIZATION OF AFRICA, URTNA, the ASIAN BROADCASTING UNION and the COMMONWEALTH BROADCASTING CONFERENCE, the ARAB STATES BROADCASTING UNION, ASBU, the CARIBBEAN BRODCASTING UNION, CBU, the ASSOCIACION INTERAMERICANA DE RADIODIFUSION, AIR and the INTERNATIONAL BROADCAST INSTITUTE.

The UNESCO, United Nations Educational, Scientific and Cultural Organization, and the United Nations itself also have their own Broadcasting Sections, whilst mention must also be made of the URT, Université Radiophonique et Televisuelle Internationale. The most significant of these bodies are detailed below.

The International Telecommunication Union - ITU

The first named, the ITU, is the oldest and most important. Today it is the specialized agency of the United Nations, and is made up of 148 member countries and 1 associate member, per September 1974. It was, however, founded in 1865 as the International Telegraph Union, seven years after the laying of the first trans-atlantic telegraph cable, and its task is still to regulate, plan and co-ordinate all forms of telecommunication. It has been operating under the United Nations flag since 1947.

When it was founded over a century ago, telecommunication was still very much in its infancy. From the, in our eyes, simple telegraphy and telephony mission of those days a big step forward has been taken, so that now the activities of the ITU comprise, apart from those in the fields of sound broadcasting, television aeronautical and maritime communications, also the involved field of space radio communications.

The work of the ITU is carried on through its four permanent organs: The General Secretariat, the International Frequency Registration Board, IFRB, the International Radio Consultative Committee, CCIR, and the International Telegraph and Telephone Consultative Committee, CCITT. For our purpose, the International Frequency Registration Board is of importance, being concerned as it is with the registration of radio frequency assignments. It is significant that in the Convention of the ITU, it is laid down that "The members of the IFRB serve not as representatives of their respective countries, or of a region, but as custodians of an international public trust".

Four times a year the IFRB publishes so called Tentative High Frequency Broadcasting Schedules, showing the frequency use for each station for a specific season, March-April, May-August, September-October and November-February. Periodic circulars keep the schedules up-to-date. The stations notify the IFRB in advance of their proposed frequency usage, which information is then processed and published in the new Tentative Schedule and possible incompabilities noted. The stations then have two months in which to submit any necessary modifications. The object of this procedure is to prevent or eliminate interference through bi-lateral discussions between the stations concerned. The ITU publishes a monthly Telecommunication Journal, in separate English, French and Spanish editions, covering all aspects of telecommunications. The seat of the ITU is in Geneva. The full address is ITU, Place des Nations, 1211 Geneva, Switzerland.

The European Broadcasting Union - EBU

The EBU was founded in February 1950 and today, 1981, comprises 40 active members and 74 associate members in 61 countries.

Here again, the EBU works through a number of permanent committees; they are legal, technical and, separately for radio and television, a programme commission. The organization acts as a kind of clearing-house for the urgent issues facing its members, which can include anything from tackling the question of tariffs for the use of telecommunication satellites and the combating of parasitic forms of advertising on television at sporting events, to the joint negotiation of radio and television facilities for such worldwide events as the Olympic Games. A major success booked by the EBU was the Inauguruation, in 1954, of the Eurovision Network, following the setting up of a study group on the initiative of the EBU in the previous year. The daily News Exchange Service of Eurovision, another EBU initiative, was followed in 1965 by the inauguration of a similar system of distribution by Intervision (see under the heading OIRT), and co-operation between the two systems has led to a regular flow of television news material between Western and Eastern Europe.

The EBU has given constant attention to the growing importance of school radio and television, and has organized international conferences to promote its further development. Close contacts are maintained with other regional broadcasting organizations, notably with the OIRT, the ABU and URTNA, to settle questions relating to television and radio programme and newsfilm exchanges, co-productions and technical collaboration.

The EBU publishes a monthly journal, the EBU Review, in English and French. There are two parts, obtainable separately. Part A - Technical, reviews all new technical developments in sound and television broadcasting; part B - General and Legal, reports on radio and television developments throughout the world in the nontechnical fields. The seat of the EBU Technical Centre is in Belgium, 32 Avenue Albert Lancaster, B-1180 Brussels, Belgium, and the Central Administration is in Switzerland, Ancienne Route, Geneva.

The International Radio and Television Organization - OIRT

The members of the OIRT are the East European countries, the Chinese People's Republic, and others, including Algeria, Cuba, the Arab Republic of Egypt, Iraq, Sudan, People's Republic of Vietnam and Korea. The total number of member countries is 25.

Like the EBU, the OIRT has an administrative office and a technical centre, both of which are in Prague, Czechoslovakia. Its specialized commissions are technical, radio programme, television programme, and an Intervision Council. They deal with all questions connected with broadcasting and the co-operation between the broadcasting organizations. The OIRT journal "Radio-Television", appears once every two months in English, French, Russian and German editions. The address of the OIRT is 15, U Mrázovsky, Prague 5 Czechoslovakia.

The Union of National Radio and Television Organizations of Africa - URTNA

Every independent African state is eligible to join the URTNA, established in Lagos, Nigeria in 1962, and be fully represented by its national radio and television organization Other African countries recognized by the Organization of African Unity are also admitted. Non-African national radio and television organizations can become associate members. Among the current activities of the URTNA are the promotion of African culture, programme exchange and participation in international conferences.

The official languages of URTNA are Arabic, English and French. A quarterly Newsletter, URTNA Review, is published. The administrative seat of the Union is in Senegal, 101 Rue Carnot, Dakar, and that of the Technical Centre is in Mali, P.O. Box 39, Bamako.

The Asian Broadcasting Union - ABU

The Asian Broadcasting Union, with 24 full members and numerous associate members was set up in 1964 as a union of national broadcasting organizations in the Asian/Pacific area. The administrative council is made up of the Australian Broadcasting Commission, All India Radio, Radio/Televisi Republik Indonesia, National Iranian Radio and Television, Nippon Hoso Kyokai, Korean Broadcasting System, Radio Nepal, New Zealand Broadcasting Corporation, Philippine Broadcasting Service and Radio Thailand.

The Union issues a monthly publication in English, the ABU Newsletter. The headquarters are in Japan, c/o NHK Broadcasting Centre, 2-2-1 Jinnan, Shibuya-ku, Tokyo 150, and the Secretary General's Office is in Australia, Box 4103, GPO, Sydney 2001.

The Arab States Broadcasting Union - ASBU

This is an inter-governmental body within the framework of the League of Arab States comprising the Arab Radio and TV organizations. It was established in 1969. The supreme body is the General Assembly, and the presidency is held in rotation among the full members, in alphabetical order of the names of the 16 member states. The address of the General Secretariat is 23, Kasr el Nil, Cairo, Egypt.

The Commonwealth Broadcasting Association

The Commonwealth Broadcasting Association has been in existence since 1945, its principal purpose being.."the professional improvement of the broadcast programmes of the member organizations and of the technical facilities". It is also concerned with.."the intensified and sustained training of professional broadcasting staff, in the fields of both programming and engineering". There are 42 member organizations encompassing the entire globe, and the association convenes each year.

The Secretariat address is Broadcasting House, London W1A 1AA, England.

Note : Complete membership lists of all the separate organizations specified above, and of others not included here, are to be found in the World Radio and TV Handbook, from which some of the information in this lesson was derived, and is hereby gratefully acknowledged.

In Conclusion We have now come to the end of our All Round DXers' Course and we hope to have justified the title. The questions and answers can be found at the end of this course.

OTHER RADIO NEDERLAND COURSES

Our SHORTWAVE PROPAGATION COURSE goes into the natural phenomena affecting, or facilitati shortwave transmissions : sunspots, solar flares, the ionosphere etc.

our RADIO SPECTRUM COURSE aims to make you acquainted with the types of emissions, band allocation, modulation, the shortwave and tropical bands, the antenna bands etc.

The SW ANTENNA COURSE aims to make you acquainted with the various antenna types, and deals with such subjects as standing wave ratio , radiator resistance, transmission lines, antenna construction etc. It is based on our existing antenna booklet, which is supplied with the lessons.

Write for our DX INFORMATION SERVICE CATALOGUE which gives further details of these and other courses, besides listing our leaflets and data sheets for improving shortwave reception or extending the scope of the receiver.

QUESTIONS TO LESSONS - Ardx Course

Lesson 2 1. What is the percentage of the band allocated to a. fixed stations, and b. shortwave broadcasting?

2. Between which frequencies do we find the high frequency or shortwave range

Lesson 3 1. What is understood by the term, tropical bands?

2. Which is the lowest shortwave band? And which is the highest?

Lesson 4 1. What basic data should be contained in a reception report?

2. Assuming a reception report has been adequately compiled, what else must be done to obtain a QSL?

Lesson 5 1. a. Which code should preferably be used in reporting to a broadcasting station?

b. What figures indicate ideal, local quality reception in this code?

Lesson 6 2 a. What radio circuit is mainly used for coupling selectivity-improving equipment?

b. Why, could you explain?

Lesson 7 3 Why is a relatively narrow bandwidth important for SW listening?

Lesson 8 4 What is meant by proper matching?

Lesson 9 1. What are the essential points to consider when compiling a taped reception report?

Lesson 10 2. a. What factors determine the ionization gradient of the F-2 layer?

b. How many reflection points will occur on a 9000km trajectory? And how many on a 2000km trajectory?

Lesson 11 3. What is the significant difference to the DXer between South American and Latin American DXing?

Lesson 12 4. Name some of the bands used by SW stations in the Asian and Pacific areas?

Lesson 13 How does the operating schedule of African stations differ to those of most European and Latin American stations?

Lesson 14 In what way can the strength of an incoming signal be reduced for SSB reception if the radio set lacks an adjustable RF preamplifier?

Lesson 15 What are point-to-point stations?

Lesson 16 How is the subdivision of the band arranged in maritime communications?

Lesson 17 What is the big advantage of the VLF frequency range to Standard Frequency Stations?

Lesson 18 When does F-2 skip occur? What kind of TV DX is possible under these conditions?

Lesson 19 What makes TV DX in Europe more complicated than in other parts of the world?

Lesson 20 In this lesson, 3 approximate limits are mentioned for ground wave, for E-layer propagation and for F-layer propagation. List them.

Lesson 21 List the shortwave amateur bands.

Lesson 22 Why should RTTY be preferred to CW in commercial traffic?

Lesson 23 Name 3 kinds of DX organisations and specify their basic differences.

Lesson 24 Mention some international broadcasting organisations.

ANSWERS TO QUESTIONS - ARDX Course

Lesson 2 1 48% of the spectrum is allocated to "fixed stations", and less than 10% to shortwave broadcasting.

2 Between 3 and 30 MHz, 100-10 m, is the HF, high frequency, range.

Lesson 3 1 Tropical bands are the 120,90 and 60metre bands, which are allocated to broadcasting in the tropical region of the earth, but which are in use by other services in areas outside this region.

2 The lowest shortwave band allocated on a worldwide basis is the 49m band, 6MHz, and the highest is the 11metre band, 26MHz. The tropical bands and the 75m, 4MHz, are not allocated on a worldwide basis.

Lesson 4 1 Frequency, or wavelength, date, time and some programme details.

2 A verification should be requested in the report to the station.

Lesson 5 1a The SINPO code, or, if the "N" and the "P" are difficult to determine the SIO-code.

b 55555 or, in the SIO-code, 555.

Lesson 6 2a The intermediate frequency, IF, circuit.

b Because a. the IF has about the same frequency value in domestic receivers all over the world, 440-470kHz, which makes it possible to design circuits and equipment with a worldwide turnover, and b. all incoming signals are converted to this frequency, so that it acts on all ranges that the receiver is able to receive.

Lesson 7 3 Because it helps to tune interferencefree in the over-crowded SW broadcasting bands.

Lesson 8 4 Proper matching is obtained when the least possible loss of energy is effected in the transfer between aerial and receiver. This is only realized when the radiation resistance of the aerials equals the input impedance of the receiver.

Lesson 9 1a To add your name and address on the tape;

b To provide information regarding frequency, date and time on tape immediately preceding or following the recording;

c To record short pieces, unless you are instructed otherwise;

d To use small reels of tape;

e To send them as soon as possible, preferably by airmail;

f Use 9½cm/sec - 3¾ "/sec.

Lesson 10 2a The position of the sun with regard to the layer, and the sunspot activity. The position of the sun follows from the season, and the time of day or night.

b 3 reflection points on a 9000km trajectory, one reflection point every 4000km AT THE LEAST. One reflection point on a 2000km trajectory.

Lesson 11 3 Latin America indicates a cultural area, South America a geographical area.

Lesson 12 4 120, 90, 75 and 60 metre bands.

Lesson 13 1 Many stations are on the air 3 times a day; in the morning, at noon and in the evening. In the weekends the transmission periods are extended.
The tropical bands are mainly used, and during the last couple of years an increased use of the 49 and 31 metre band is made.

Lesson 14 2 By an, adjustable or fixed, capacitor between the aerial and the aerial socket of the receiver, or by removing the antenna plug altogether.

Lesson 15 3 Stations operating between two fixed locations on earth for commercial or public services.

Lesson 16 4 The ships use the lower half of the band, the coastal stations the upper half. Voice bands are allocated at the two extreme frequencies, the lowest and the highest, a call band is reserved for all ships in the middle of the range allocated for ships.

Lesson 17 1 Very low frequencies are virtually independent of solar phenomena, and thus are very reliable.

Lesson 18 2 F2-skip can occur during periods of high sunspot activity in the daytime.

Lesson 19 3 The use of various television systems with different numbers of lines per frame.

Lesson 20 4 Medium wave ground wave propagation 400 km
" " E-layer propagation 3500 km
" " F-layer propagation beyond 3500 km

Lesson 21 1 The shortwave amateur bands are :
80m 3500 - 3800 kHz in regions 1 & 3
3500 - 4000 kHz in region 2 (America)
40m 7000 - 7100 kHz in regions 1 and 3
7000 - 7300 kHz in region 2 America)
20m 14000 - 14350 kHz
15m 21000 - 21450 kHz
10m 28000 - 29700 kHz

Lesson 22 2 Because it is quicker. The operators are not required to work with morse code, and the machine does the coding, resp. the decoding.

Lesson 23 3 DX clubs - organisations of people interested in long distance reception of all kind of radio-frequent transmissions - long wave, medium wave, shortwave, VHF, UHF. Radio Listeners' Clubs - organisations run by radio stations in order to further their contact with potential reporters, to keep informed on reception of the station. Amateur DX Clubs - organizations of people who DX the amateur bands.

Lesson 24 4 EBU, (Europe) ABU, (Asia), URTNA, (Africa).